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Original Communications

OVARIAN PREGNANCY, WITH THE REPORT OF A CASE

BY LYLE A. SUTTON, M.D., ALBANY, N. Y.

From the Gynecological and Pathological Departments of the Albany Hospital and Union University (Albany Medical College).

OVARIAN pregnancy is a condition which has been recognized for many years. The number of cases, however, is comparatively small, and there are many points, particularly those regarding the exact location of the pregnancy and why it developed there, that have not and cannot be settled until the entire subject has been more carefully studied. I believe that the following case of ovarian gestation presents some interesting problems regarding the type and the origin of the tissue upon which a fertilized human ovum is likely to develop, and also whether or not all apparently primary ovarian pregnancies originally developed in that organ. The case is from the Service of Dr. John A. Sampson to whom I am indebted for permission to use the clinical records.

The two commonly accepted theories of ovarian gestation are as follows:

1. The spermatozoön enters a graafian follicle through a very small opening before the ovum has been discharged, and this aperture may, or may not, become closed subsequently.

2. The spermatozoön may enter an old ruptured follicle into which another follicle ruptures, and there fertilize the ovum of the latter (Leopold).[1]

We should add to these two theories a third, namely, that a pregnancy situated in the ovary may have been primarily in the tube. Tubal abortion might permit the ovum to escape through the tube into the ovary where it is retained, thus appearing as a primary ovarian pregnancy.

NOTE: The Editor accepts no responsibility for the views and statements of authors as published in their "Original Communications."

The majority of observers believe that ovarian gestation usually occurs in a graafian follicle, and some, notably Ray,[2] state that it cannot occur in any other place. On the other hand, Webster[3] maintains that the pregnancy can only develop in tissue of müllerian type. There is much evidence in favor of both views, and of the latter probably much more than has been generally recognized.

Uterine pregnancy has occurred in women having only an ovary on one side and a tube on the other, in which case the ovum must have traversed the peritoneal cavity. Spermatozoa no doubt pass through the fallopian tubes into the peritoneal cavity, as they are sometimes found in the routine microscopic examination of the tubes. Should an ovum, then, be fertilized in the peritoneal cavity there is the possibility of its becoming implanted somewhere in the pelvic cavity. This is known to occur, as pregnancy has developed on detached pieces of fimbriae adherent to pelvic structures, and also on the surface of the ovary itself. The changes in the mucous membrane of the tubes and the adhesions about them due to salpingitis may retard the progress of the ovum, and are considered important factors in the etiology of most types of ectopic gestation.

I was unable to find any structures in the wall of the ovarian hematoma in our case which might suggest that the pregnancy had occurred in a graafian follicle. Similar findings have been reported by several writers, notably Thompson,[4] Franz,[5] Webster,[3] Hewetson-Lloyd,[6] Bryce, Teacher, and Kerr,[7] Hunter,[8] Chiene,[9] and Holland,[10] making a total of at least nine authentic cases of ovarian pregnancy that have occurred outside of a graafian follicle. In none of the cases reported has the gestation sac been completely surrounded by a corpus luteum, although lutein cells have often been found in the wall of an ovarian hematoma, and might be considered as strong circumstantial evidence that the pregnancy had developed in a graafian follicle. However, a pregnancy developing anywhere in an ovary might, in the course of its growth, encroach upon or rupture into a graafian follicle, thus making the latter a part of the general gestation sac, and giving the appearance of its having orginated in the follicle. Ray[2] accounts for a pregnancy outside the follicle as an attempt on the part of the ovum to find a more suitable bed for its implantation. He states that it first becomes embedded in the corpus luteum, but since the connective tissue layer just outside is more favorable for its growth it burrows out into this layer, and apparently loses its connection with the follicle.

A decidual reaction is thought by some to be necessary for the implantation of the ovum. The outer layers of a fertilized ovum possess the inherent property of dissolving or digesting the tissues with which they come into immediate contact, thus forming a pit into which the ovum burrows. This procedure opens up small blood vessels, and the ovum throws out villi which develop trophoblastic and plasmoblastic

layers. A true decidual reaction is not necessary, but acts rather to limit the growth until placentation is complete. It would seem, then, that a fertilized ovum can become implanted on any tissue which offers the proper soil. Pregnancy normally occurs in tissue of müllerian type which, wherever present, offers certain genetic advantages over other kinds of tissue as a nidus for the ovum. It only remains, then, to prove the presence of müllerian tissue in the ovary to strongly suggest a fourth theory of the origin of ovarian pregnancy. This point will be more fully discussed later. While fertilization *in situ* cannot be denied, and in fact Stratz[11] has demonstrated the entrance of spermatozoa into a ruptured follicle in the ovary of a Sorex, nevertheless, in view of the conditions found in many cases, an extrafollicular implantation of some type must be considered.

The criteria on which to base a diagnosis of ovarian pregnancy are essentially those stated by Spiegelberg[12] in 1887:

1. The tube on the side of the pregnancy must be intact.
2. The fetal sac must occupy the position of the ovary.
3. The ovary must be connected with the uterus by the uteroovarian ligament.
4. Definite ovarian tissue must be found in the wall of the sac; (modified by Williams,[13] so that the wall must contain ovarian tissue in several places).

Other less imperative requirements have also been suggested:

1. The embryo must be visible in the cavity of the gestation sac (Jacobson, 1908).[14] In pregnancies of sufficient duration the embryo can be found, but in the majority of cases the pregnancy is terminated at an early date and the embryo rapidly disintegrates, being finally represented by an amorphous mass, or is lost entirely by early rupture of the gestation sac. An embryo was not found in 24 of the 43 cases reviewed by Hunter.[8]
2. There must be placental tissue within the ovarian stroma (Heinecken).[15]
3. The tube must not only be intact but free from any evidence of gestation, (Norris).[16]

It has been observed by several writers that in ovarian pregnancy a decidual reaction may occur in the tube of the corresponding side, and also in the uterus as may be seen in any other type of ectopic gestation. Norris[16] states that the uterine decidua is usually expelled through the cervix shortly after the death of the embryo. Decidua-like changes have been noted in almost every region of the body during pregnancy, hence a decidual reaction in the corresponding tube is not of as much importance as has been ascribed to it. The general trend of opinion, however, is to make the criteria less and less exacting. Whitehouse[17] based his case of ovarian pregnancy on the presence of plasmodo-trophoblastic tissue, without villi, in the walls of an ovarian hematoma. The first four requisites, however, are generally accepted and it remains for future investigators to determine just what criteria are absolutely necessary.

These considerations make it difficult to estimate correctly the total number of authentic cases. The writer has reviewed those published, and feels that there can safely be included the 19 cases accepted by

Norris,[16] and the 22 added by Lockyer,[18] and would add the cases of Meyer and Wynne,[19] Lieb,[20] Ray,[2] Fallon,[21] Chalfant,[22] and Hunter,[8] making a total of 47. Seventy-two cases have been reported from 1909-1922 inclusive, and among them are some which no doubt should be placed in the accepted list, but cannot be admitted because of insufficient data or lack of microscopic examination.

CASE HISTORY

Mrs. H., aged 27 years, an American housewife, white, was admitted to the Albany Hospital on Sept. 25, 1922.

Chief Complaint.—Pain in the abdomen, particularly on the right side, which had increased in severity since its onset July 6th, 1922; also pain on urination and defecation, and a bloody leucorrheal discharge.

Past History.—The patient's general health has been poor for the past five years. In 1913 she had her first attack of abdominal pain which was more marked on the right side, and was thought to be due to appendicitis. Since then she has had four or five attacks of pain in the lower abdomen, which were accompanied by pain on urination and defecation, leading to a diagnosis of pelvic inflammatory disease. A persistent leucorrheal discharge has been present since 1915.

Menstrual History.—The menstruation began at 18 years, and was always regular, occurring every twenty-eight days. It was painful and profuse for the first two or three days, and accompanied by pressure and "bearing down" sensations. The duration of the flow was from four to five days. The patient had never been pregnant although married five years.

Present Illness.—On April 20, 1922, the last normal menstrual period occurred. May 26, menstruation started and was not normal, being more excessive, accompanied by nausea and vomiting, and with more pain and "bearing down" sensations than usual. Her physician told her at that time that she might be pregnant, and possibly might abort. During the month of June she missed her period entirely.

On July 6, she was suddenly seized with sharp pains in the lower abdomen, more marked on the right side. She went to bed immediately, but the pain so increased in severity that it required repeated injections of morphine to control it. The next day she felt better but the soreness and tenderness in the lower right quadrant persisted, and this soreness progressively increased until her next menstrual period. A small amount of bloody leucorrheal discharge was present.

On July 27, her next menstrual period occurred, which she says was brought on by washing clothes in a tub. The total amount of blood lost was about normal. This period was not accompanied by nausea and pain, but following the flow, pain developed in the lower right quadrant and became more severe than ever before, coming often in paroxysms lasting three to four hours, and requiring hot packs and anodynes to control it.

On Aug. 15, the pain on urination and defecation became so severe that she again consulted her physician who confined her to bed. Three days later during the night she was seized with pain in the lower end of the spine and shortly afterward began to flow, continuing about five hours and saturating two napkins. This was the only evidence of menstruation during August. The pain on urination and defecation, and the bloody leucorrheal discharge were still present.

Sept. 15, menstruation occurred again and was practically normal.

Sept. 18, the patient on getting out of bed, said that she felt a slight fullness

with tenderness in her right side. She was admitted to the Albany Hospital seven days later.

Examination showed a small, well developed, but rather poorly nourished woman. The abdomen was not distended but was quite generally tender, particularly in the lower right quadrant. No masses were palpable in the abdomen. The cervix was smooth, hard, and normal in size and position; likewise the uterus. On the right side, and partially filling the culdesac, was a doughy mass about the size of an orange which apparently had no direct connection with the uterus.

Clinical Diagnosis.—Right tubal pregnancy with a hematocele in the culdesac.

The patient was operated upon Sept. 27, 1922, by Dr. John A. Sampson, through a mid-line incision, and the appendix first removed. The culdesac was filled with a large mass involving the right ovary, surrounded by old blood and many blood stained adhesions. The left tube and ovary were also enveloped in numerous adhesions. There was no free blood in the pelvic cavity. A panhysterectomy and bilateral salpingooophorectomy were done.

The patient made an uneventful recovery and was discharged from the Albany Hospital on Oct. 18th, 1922.

DESCRIPTION OF THE SPECIMEN REMOVED

The specimen consists of the uterus and adnexa (Fig. 1). The cervix is smooth and regular, the external os slightly patulous, and on section is patent throughout. The uterus measures 5.5 cm. x 5 cm. x 3.5 cm. It is smooth, firm and contains

Fig. 1.—Right ovarian pregnancy, posterior view of the uterus, tubes and ovaries (X 1/2). The right ovary is replaced by a hematoma (attached to the uterus by the uteroovarian ligament) in the center of which is situated a gestation sac (see Fig. 2). The distal portion of the right tube is densely adherent to the superior surface of the ovarian hematoma. The left tube is sealed and covered with adhesions.

no palpable tumor masses. A few adhesions are present on the posterior surface where the surrounding structures had been attached. On section the uterine wall varies from 1.5 to 1.7 cm. in thickness. The endometrium is quite hyperplastic and measures 3 to 5 mm. in thickness.

The left tube is 9 cm. long and gradually increases in size as it approaches the fimbriated extremity, and ends in a sealed bulbous mass measuring 2 cm. x 3 cm. x 2 cm. This mass is bound to the ovary by numerous adhesions. The remainder of the tube is also reddened, roughened, and covered by fibrous adhesions. The sealed fimbriated extremity is roughly oval in shape, and spongy. On section it presents a honeycombed appearance with spaces varying in size from 1 to 5 mm. in diameter, which have been formed into irregular shapes by fibrous connective tissue septa of varying thickness. These spaces are filled with a small amount of clear mucoid material and are lined with a smooth glistening membrane. The lumen

of the tube is patent, although nearly occluded at its proximal end. It contains no macroscopic blood. Its walls are definitely thickened throughout.

The left ovary measures 4.5 cm. x 4 cm. x 2.5 cm. It is cystic and covered by blood stained fibrous adhesions. On section it is composed chiefly of one large and numerous smaller cysts filled with clear fluid.

The right tube is 10 cm. long, and approximately 3 cm. from the uterus it becomes continuous with a large roughly oval mass measuring 10 cm. x 6.5 cm. x 6.5 cm. The tube can be followed as a distinct ridge along the anterior curvature of this mass for a distance of 4 cm., where the fimbriae are spread out over its anterior superior surface. The mass occupied the position of the right ovary, and is attached to the uterus by the ovarian ligament. The mass is partially covered by blood-stained adhesions, and is doughy and fluctuant. There are numerous cystic areas varying in size from 1 to 4 cm. in diameter, and which protrude 2 to 5 mm. above the general outline of the mass. The wall is very thin over these areas and transmits the color of a dark chocolate colored fluid. There is a small perforation 5

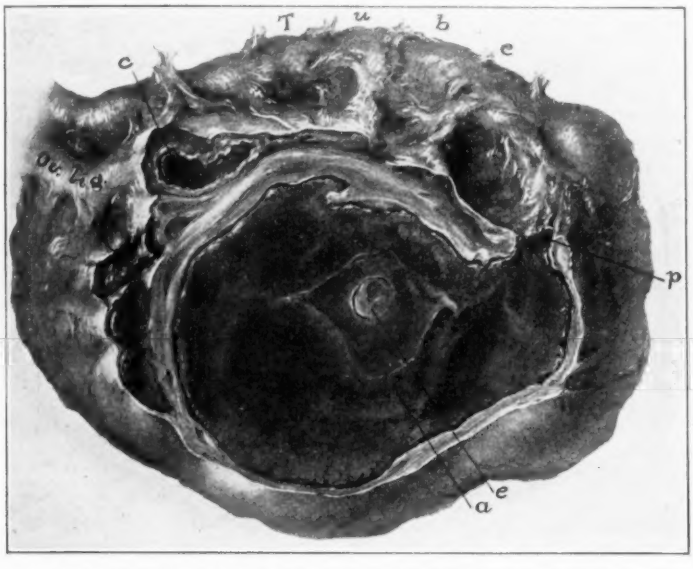

Fig. 2.—Frontal section through the ovarian hematoma showing the gestation sac (*a*) and the remains of the embryo (*e*) (X 5/6). The perforation of the hematoma is indicated at (*p*), and a corpus luteum at (*c*). The cavity of the latter does not communicate with the cavity of the large ovarian hematoma.

mm. in diameter on the posterolateral surface of the mass, through which dark bloody fluid is escaping.

The entire specimen was hardened in formalin and frontal sections 1 to 2 cm. thick were made of the right ovarian hematoma. The cut surface of Section I, (2 cm. thick) cut from the posterior surface (Fig. 2.) shows the wall of a cyst 2 to 4 mm. in thickness. At the outer anterior pole of this section there is a perforation 8 mm. x 5 mm., filled with dark clotted blood. In the median anterior and superior poles, and lying apparently in intimate connection with the wall of the cyst is what appears to be a corpus luteum 1.5 cm. x 0.4 cm. x 0.8 cm., with some hemorrhage and a blood clot in its central portion. This blood clot is partially surrounded on its medial and anterior surfaces by fibrous tissue containing here and there small amounts of orange yellow pigment.

The cavity of the large cyst is filled with clotted blood. In its upper, anterior

and slightly lateral portion, is a somewhat pentagonal-shaped sac filled with a rather homogeneous reddish brown slightly translucent getatinous material. In the central portion of this sac is a round, pale body having the dim outlines of an embryo which measures 5 mm. in diameter. This sac seems to be attached along its lateral and superior surfaces to the wall of the hematoma 1 cm. mesial to the perforation, by a pedicle 4 mm. in width and 3 mm. in length.

Section II, is 1.2 cm. thick, anterior to Section I. The ovum can no longer be seen, and there is but one large cavity filled with blood clot. The median wall of the hematoma is much thicker than any other portion and contains four discrete cysts varying in size from 3 to 10 mm. The largest lies in apposition to the ovarian ligament.

Section III, is 1.2 cm. thick, anterior to Section II. This section was cut through the fallopian tube (Fig. 3) showing its attachment to the anterior superior aspect of the ovarian hematoma, which at this level also contains only clotted blood. The fimbriae are intimately connected with its lateral anterior superior surface but

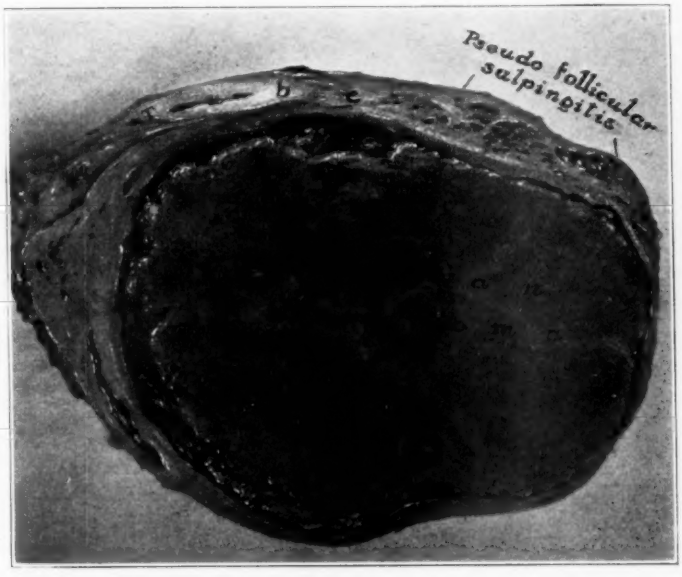

Fig. 3.—Retouched photograph (X 5/6) of a frontal section through the fallopian tube showing the relations of the tube to the ovarian hematoma. The fimbriated extremity of the tube is spread out over the superior and lateral surfaces of the ovary, but the lumen of the tube does not communicate with the ovarian hematoma. The pseudofollicular salpingitis is shown.

there is no direct junction between the lumen of the tube and that of the large ovarian hematoma, the former being separated from it by a wall of compressed tissue measuring 1 to 2 mm. in thickness. The fimbriae on this side present a honeycombed formation of spaces, each a millimeter or less in size, and separated into irregular groups by septa of white fibrous tissue as in the left tube. Along the posterior inferior medial pole is a flattened yellowish body, 2 cm. x 0.5 cm., resembling an old corpus luteum.

Section IV, is 1 cm. thick. The large cavity is filled with clotted blood in which are scattered areas of lighter colored firmer tissue, probably old fibrin.

Microscopic Examination.—The wall of the ovarian hematoma is composed chiefly of dense collagenous tissue greatly thinned out except along the inner pole where there is considerable normal ovarian tissue. There are many old and recent adhesions

on the surface of the ovary. The structure of the wall varies. The thinner portions which are confined to the lateral half, are composed of dense fibrous tissue in which are a few smooth muscle fibers concentrically laid down, but not presenting any typical ovarian stroma. The greater part of the wall, however, is composed of characteristic ovarian stroma with numerous corpora albicantes, and primordial and graafian follicles in various stages of development. Recently ruptured graafian follicles are not found. The blood vessels in the wall are dilated and there are numerous areas of old and recent hemorrhage of varying sizes scattered through the wall. Considerable lymphocytic infiltration, chiefly perivascular, is present in the thinner areas of the wall. Numerous cystic cavities varying in size from less than a millimeter to 2 cm. in diameter, lined by low cuboidal epithelium and containing a small amount of epithelial debris, are present in all except the thinnest portions. The yellow body along the mesial pole appears to be an old corpus luteum or corpus albicans with places suggesting groups of luteum cells or large

Fig. 4.—Photomicrograph (X5) of a portion of the ovarian hematoma showing the gestation sac (*a*) in the center of which are the remains of the embryo (*e*). The embryo (*e*) is represented by an irregular amorphous mass lying in a gelatinous substance (*c*) which is contained within the chorionic and amniotic membranes (*a*). A group of chorionic villi is shown attached to the chorionic vesicle and extending out into the surrounding blood clot. Some of the villi of this same group are attached to the stroma lining the wall of the ovarian hematoma.

mononuclear phagocytes filled with blood pigment. Considerable hemorrhage, more recent than would be expected from the apparent age of the corpus luteum, is present in the center of this body which, however, has no definite connection with the large hematoma. The inner lining of the wall of the large hematoma presents the most interesting features. The greater part of it has no definite lining, the innermost layers which are compact, composed chiefly of organizing connective tissue, and contain a large amount of blood pigment, are fused with the large blood clot. This new connective tissue contains, particularly in the border zone, numerous large mononuclear cells filled with blood pigment. In other areas the hemorrhage seems to have extended into the wall from the central hemorrhage. Sections from other regions show a more definite demarcation and the hematoma is lined with low

cuboidal epithelium. This epithelial lining is heaped up in some places so that it appears to be several cells deep. It is reflected over small buds of closely packed small round cells, probably lymphocytes, which are projecting into the hematoma. Several sections from various widely separated areas show in addition to these buds very definite papillary prolongations (Fig. 6) extending into the large hematoma, covered by columnar epithelium possibly ciliated, and having the stroma character-

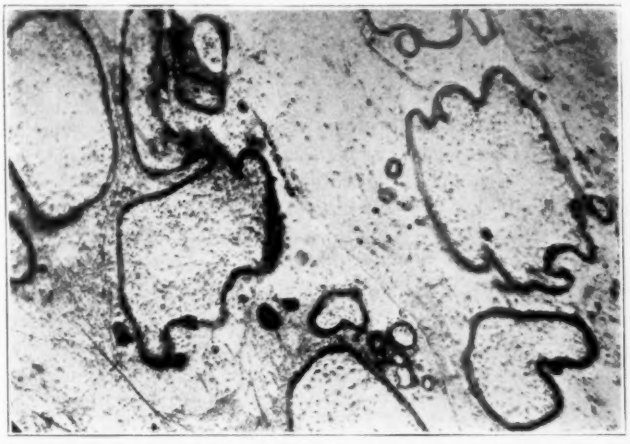

Fig. 5.—Photomicrograph (low power) of some fairly well preserved chorionic villi which are scattered through the ovarian hematoma, the best preserved being along the periphery. Langhans' layer can be clearly seen on many of the villi.

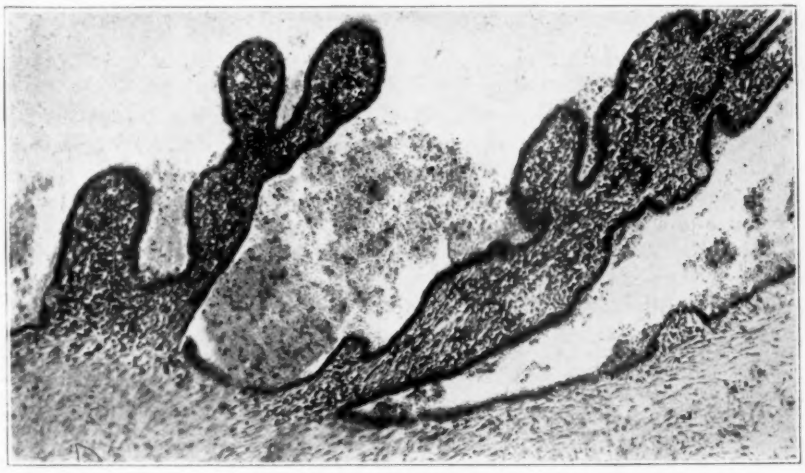

Fig. 6.—Photomicrograph (low power) of the müllerian tissue found lining the large ovarian hematoma in several widely scattered places. It resembles the papillary prolongations of the tubal mucosa and is covered with columnar epithelium.

istic of müllerian tissue. They resemble very strongly the papillary projections of the tubal mucosa.

The hematoma occupies the greater part of the sections, and is composed of blood in all stages of degeneration. Some areas contain a large amount of fibrin which is being organized. Other areas are disintegrating and becoming infiltrated by leucocytes of all types, polymorphonuclears often predominating. The chorionic

vesicle lies approximately in the center of this blood clot, and the whole area between the chorion and the ovarian stroma is studded with chorionic villi which are in all stages of degeneration with much leucocytic infiltration, but still possessing the characteristic structure of tropho-plasmoblastic layers and having the typical myxoid connective tissue center (Fig. 5). Many of the villi are attached to the chorionic vesicle and some are embedded in the proliferating connective tissue lining the hematoma. The greater number lie free in the blood clot and are in advanced stages of degeneration, but those along the periphery in contact with the wall stain normally, and hence undoubtedly derive their vascular supply from the wall.

The gestation sac (Fig. 4) is well outlined by the amniotic and chorionic membranes (a), which in some places are separated a short distance by blood clot, and in other places seem to be closely adherent to each other, or else one is absent. The structure of the membranes can quite distinctly be made out as an inner cellular layer of fair sized, rather oval-shaped, cells and an outer more homogeneous layer with a few nuclei. Just inside the membranes is a definite irregular zone (b) thickly studded with cells, the outlines of which are indistinct but the nuclei are quite large, ovoid, and stain fairly well with hematoxylin, the cytoplasm being filled with basophilic bodies. Numerous polymorphonuclears are also present in this area. Inside this zone is a homogeneous area (c), composed of old blood clot blending on its inner margin with another (d) of the same type just described. This surrounds the amorphous mass in the center (e), which is composed of degenerating cells of various sizes, shapes, and staining reactions, and while it undoubtedly represents the remains of the embryo, normal embryonic tissue was not found.

The tube, accompanying the hematoma shows an old chronic inflammatory process near the uterus. The infoldings of the mucous membrane are few and there is some lymphocytic infiltration. The distal portion of the tube is adherent to the surface of the ovarian hematoma. Where the fimbriated extremity is spread out over the hematoma the honeycombed spaces previously described are lined with ciliated epithelium and filled with desquamated cells, old blood, and debris. The walls are infiltrated with lymphocytes and the whole picture is that of a pseudofollicular salpingitis. The fimbriated extremity has no microscopic connection with the large hematoma and there is no evidence of any decidual reaction in the tube. Nor were any chorionic villi found.

The left tube shows a more marked pseudofollicular salpingitis than the right tube. The mucous membrane is much more hyperplastic, but there is less blood in the lumen. There is no decidual reaction in the left tube.

The left ovary is covered with old adhesions and contains a number of follicular cysts lined with low cuboidal epithelium. Corpora lutea are not present.

The uterus is microscopically negative except for a slight hyperplasia of the endometrium. A decidual reaction is not present.

DISCUSSION

The foregoing case adds nothing to the clinical picture of ovarian pregnancy, and in fact there are no symptoms or signs by which it can be accurately diagnosed as such. They are the same as for any other type of ectopic gestation.

The early death of the embryo can be attributed to a great many causes, such as development in an abnormal environment, poor blood supply, or some reaction of the surrounding tissues which is antagonistic

to its growth. Granting that a pregnancy may occur in a graafian follicle, it has been suggested by Meyer and Wynne[19] that the epithelial cells internal to the luteal cells are inimical to the life of the embryo. The most probable cause of its death is the massive hemorrhage. In practically every case reported the chorionic villi have been found lying free in blood clot. The hemorrhage may be due to rupture of the growing gestation sac, the implanted ovum may be on or near the surface, or the syncytial elements may perforate the ovarian capsule and allow the escape of intervillous blood. This hemorrhage breaks up whatever attachment the chorionic vesicle may have, and results in the rapid death of the embryo which then disintegrates, although the membranes may persist for a comparatively long time.

An important question is that concerning the type of tissue in which a fertilized human ovum may develop. Webster[3] states that on phylogenetic grounds there is strong reason to believe that the fertilized ovum in the human female can begin its development only in tissue derived from the müllerian tract, and if it can be established that müllerian tissue can occasionally be found in the ovary, it is reasonable to suppose that the embedding of the ovum may take place in this tissue. This ectopia of müllerian tissues Webster himself saw, and its genesis has been rationally explained by Sampson.[23] The latter investigator has shown that during the menses, especially where there is any obstruction to the outflow, the menstruum containing bits of endometrium or tubal mucosa may pass out through the tubes into the peritoneal cavity, and that endometrial implants are often found in the pelvis on the structures which would readily be soiled by this blood. Blood has been observed exuding from the fimbriated extremity of the fallopian tubes in women operated upon during the menstrual period. Acting upon a suggestion of Dr. Sampson's I have examined such blood obtained at operation and have found in smears made from this blood, cells of epithelial morphology singly and in clumps. These cells would be most apt to become implanted upon the under and lateral surfaces of the ovary where they would most naturally fall in coming out of the tube (Sampson).[23] It is a very significant fact that nearly all of the cases of ovarian pregnancy have occurred in these same locations, rather than at the hilum, as suggested by Freund and Thome,[24] who base their opinion on the fact that the large blood vessels are located in that area. These endometrial implants react to menstruation and even to pregnancy, the same as any other müllerian tissue. Bleeding into these implants in the ovary at the time of the menstrual period gives rise to the formation of ovarian hematomas. Anderson[25] and others have stated that there has been no explanation of ovarian hematomas, and that they may all be ovarian pregnancies, but in view of the recent work of Sampson,[23] it is probable that many ovarian hematomas arise from endometrial implants and are of very common occurrence.

Webster[3] in describing the areas in question advanced the view that they represent detached portions of müllerian tissue which have become adherent to the surface of the ovary, and further that it is possible that the genetic action of this müllerian issue may sometimes determine the embedding and growth of a fertilized human ovum in the ovary. It is, then, definitely known that müllerian tissue commonly occurs in the ovary, and moreover, is often implanted there from the uterus or tubes and reacts much the same as any normally placed müllerian tissue. Therefore, knowing that ova are sometimes fertilized in the peritoneal cavity, it seems in accord with the performance of one of the most highly specialized functions of the human body, that the fertilized ovum should become embedded in müllerian tissue wherever it might be, as this tissue would present a more favorable reaction than would the peritoneum covering the pelvic structures or a blood clot in a graafian follicle.

I believe that the pregnancy in the case here presented may have occurred in an implantation of endometrial type located on the surface of the ovary, or in the cavity of an endometrial cyst, thus accounting for the presence of the müllerian tissue in the wall of the ovarian hematoma, in the center of which the remains of an embryo with its membranes was located. In reviewing the literature there are other cases which may have been of the same type; for instance Webster[3] showed papillary prolongations projecting into the hematoma as villi covered with a syncytium, and which may have been müllerian in origin. McCann[26] also described a case which may have occurred in an endometrial implant as it was located in a multiloculated cystic ovary, and we know that in the rabbit, endometrial implants on the ovary are prone to form multilocular cysts as has been experimentally proved by Jacobson.[27] Dr. Jacobson has implanted bits of endometrium from a rabbit's uterus on and into the pelvic structures of the same rabbit, and these implants have there developed into endometrial cysts very similar in structure to those found in human beings. McCann also showed a definite adenomatous growth in the tissue just outside the gestation sac. Definite groups of cells which were undoubtedly epithelial, were seen on the suface of the ovary by Rubin[28] in the case which he presented, and these may have been müllerian in origin. Since there have not been any cases reported which have been examined in order to determine whether or not müllerian tissue was present, it is impossible to state how often this tissue occurs associated with pregnancy in an ovary.

Pregnancy in an endometrial implant may account for the decidual reaction claimed by many to be present, as this tissue certainly possesses as an inherent characteristic the potentiality of decidual changes. Decidual reactions have been seen in uterine pregnancy on the surface of the ovaries, broad ligament, posterior surface of the uterus, and in the culdesac by Webster,[3] Norris,[16] Rubin[28] and others. In other words, the distribution is identically the same as the endometrial implants described

by Sampson.[23] This is a very significant fact, and gives rise to the question whether the decidua escaped through the tubes and was implanted as such, or whether it is a response to the stimulus of pregnancy on the part of müllerian implants already there. Some observers think that this decidual reaction is due to some special quality inherent in the tissues, while others do not account for it at all. At any rate it is agreed that it is a characteristic solely maternal, and the implantation theory seems to be the most logical explanation yet offered.

Our case is one of pregnancy in an ovary although it is difficult to prove that it was primarily there. In nearly all cases in which the hematoma reached the size attained in this one the tube is necessarily in close contact with the hematoma and the fimbriae are often sealed over the outer surface of it. The further advanced the pregnancy the greater is the difficulty of determining what exact relation the tube may have borne to the ovary earlier in the pregnancy. The possibility of a tuboovarian pregnancy must be carefully considered in all cases of apparent ovarian pregnancies. Tubal pregnancies usually terminate early either by abortion or rupture, and by the former method if situated near the fimbriated extremity. The ovum escaping by tubal abortion or rupture presumably may become implanted on the pelvic or abdominal structures giving rise to a so-called abdominal pregnancy. There is also the possibility that the ovum may become embedded in a ruptured graafian follicle, on an endometrial implant, or in an endometrial cyst and give the appearance of having been primarily in the ovary. Pregnancy in an accessory tube which was closely apposed to the ovary would also present a confusing picture. It is difficult to prove that a pregnancy is primarily ovarian unless it is very early, and is found intact in an ovary which has no connection with the tube, and the villi being actually attached to some ovarian structure. There are other cases like ours in which the embryo is further developed and which might be considered ovarian in the absence of any other explanation. In our case the distal portion of the tube was attached to the ovarian mass, and there was some old blood and cellular debris in the dilated spaces of the tubal mucosa, but the same material was also present in the tube on the opposite side though to a lesser degree. The greater part of the fimbriated extremity may have been already attached to the ovary as a result of the preexisting pelvic inflammatory disease. Blood alone in a fallopian tube cannot be regarded as evidence of a pregnancy in that tube.

It is certain that chorionic villi cannot live long when floating free in blood, as is demonstrated by the marked degeneration of the villi present in sections of recent tubal pregnancies. A strong point in favor of the gestation in our case being primarily ovarian, or actually developing for a time in the ovary, is that a great many of the villi are well preserved and some are actually attached to the organizing tissue lining the large ovarian hematoma. One would not expect villi to live two or three

months, the approximate postmortem time of this embryo, unless they had definite connections with the wall of the hematoma in which they were found. Furthermore, this case complies with all of the criteria laid down by Spiegelberg with the modifications already stated. Hence it may be an example of primary ovarian pregnancy, the most extraordinary feature being that the ovum undoubtedly developed in müllerian tissue which represented either a congenital "rest" or, what is more likely was a müllerian implant acquired during adult life. This latter concept will have to be granted the most thoughtful consideration by students of ectopic pregnancy as being entirely rational and probably the correct explanation of many ovarian gestations. Another plausible mechanism consists in there having been primarily a tubal pregnancy which was followed by abortion into a cystic cavity in the ovary, which was lined *a primis* or *per secundum* by tissue of müllerian type. By that is meant that the cavity could be either that of a hemorrhagic (menstruating) cyst in the sense of Sampson, or else be derived from a graafian follicle which became lined with tissue from the mucosa of the tube, fragments of which tissue had been carried in with the ovum when it was extruded from the tube. In other words, "pregnancy in an ovary" is not necessarily a "primary ovarian pregnancy." It may be a secondary ovarian pregnancy. The distinction should be recognized.

CONCLUSIONS

1. The case presented is one of ovarian pregnancy of about six weeks' duration. It followed the typical course of an ectopic pregnancy and was operated upon approximately two to three months after the onset of the apparent termination of the pregnancy.

2. The important anatomic findings are the following:

   A. The tube on the side of the pregnancy was intact and free from any evidence of pregnancy.

   B. The hematoma enclosing the pregnancy occupied the position of the ovary.

   C. This hematoma was attached to the uterus by the uteroovarian ligament.

   D. Normal ovarian tissue was found in several places in the wall of the hematoma.

   E. Chorionic villi were found forming a junction between the chorionic vesicle and the connective tissue lining the ovarian hematoma.

   F. A degenerated embryo was located within this gestation sac.

   G. Müllerian tissue was found in several places in the lining of the wall of the ovarian hematoma.

3. The presence of the müllerian tissue in the ovary may be explained either by the implantation theory suggested by Sampson, or by the hypothesis that it is derived from a congenital "rest." The findings

strongly suggest the implantation of a fertilized human ovum in an endometrial implant upon the ovary, but another mechanism seems quite as plausible, i. e., a primary tubal pregnancy followed by extrusion of the fertilized ovum from the fimbriated extremity of the tube into a preformed cavity in the ovary, this cavity being either a menstruating cyst such as has been described by Sampson, or a graafian follicle or corpus luteum cyst which became lined with tubal mucosa, fragments of which were carried in with the ovum.

4. The study of this case would seem to make imperative a division of all cases of ovarian pregnancy into (1) primary and (2) secondary. A primary ovarian pregnancy is one in which the ovum after its fertilization undergoes the rest of its development within the ovary. A secondary ovarian pregnancy is one in which the ovum following its fertilization undergoes a certain stage of its development, usually very short, in some nearby structure or cavity, usually the fallopian tube, and then becomes implanted in the ovary.

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THE REPAIR OF BIRTH LACERATIONS OF THE CERVIX UTERI

I. Immediate Trachelorrhaphy

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ABOUT five years ago we undertook to investigate cervical lesions in regard to their sequelae among our patients at the Women's Clinic of the Stanford School of Medicine. We began this study by centering our attention on the sequelae of birth traumas and their relation to other disturbances of the generative organs. The survey of our material brought out among other facts that cervical lacerations of various degrees were present in about 80 per cent of all women who had borne children. Our material included all patients, regardless of the type of labor they had experienced or the individual attention they had received in their confinement. It is only fair to state here, that those who had been confined in our own maternity wards were left with cervical lacerations just about as frequently as those who had been attended elsewhere. In other words, surroundings and the best of obstetrical skill did not prevent cervical trauma.

We felt then, as we do today, that cervical birth lacerations have not been regarded with the necessary seriousness. It has been conservatively estimated that some 40 per cent of cervical lacerations ultimately lead to further pathology (Hirst). The remaining 60 per cent are made up by those small lacerations that have healed spontaneously by granulation, often not leaving any scars evident to visual examination but detectable to the trained finger as irregular deep-seated lesions. Although we do not know the relation of any of these cervical lesions to malignancy, generally speaking, no further disturbance arises from these small scars, as far as we know today. This aspect changes with the more severe lacerations, the majority of which may be productive of further pathology. Erosions with low grade infections, cystic degenerations and various degrees of cervicitis are the commonest resulting pathologic lesions. They in turn are conducive to parametritis, often leading to spasticity of the sacro-uterine ligaments with its sacral backache and feeling of weight in the pelvis; to congestive disturbances of the fundus of the uterus; and ultimately to hyperplasia and hypertrophy of the endometrium accompanied by menstrual disorders.

Commonly, the process ends in hypertrophy and fibrosis of the fundus of the uterus, often faultily called metritis. The relation of

cervical infections to bladder disturbances, and especially to trigonitis of obscure origin, is little appreciated and deserves special mention. It is further pointed out that all these lesions either simply, or as a whole, have a bearing on sterility. There also exists a relation between cervical pathology and reflex disturbances elsewhere. The writer has observed the relation of cervical lesions to nervous reflex symptoms manifesting themselves by obscure intestinal disturbances. It is not at all theoretical that they are directly related to disturbances of the sympathetic nerve supply. It is of interest to note in this connection that a careful study of cervical tissue removed at trachelo-plasties will occasionally disclose sympathetic nerve fibers and ganglia surrounded by scar tissue. Since the correction of the cervical condition has been followed by an amelioration of the sympathetic disturbances elsewhere, especially in the intestinal tract, it is only reasonable to assume that an irritation of the cervical sympathetic innervation can set up reflex disturbances in any viscera whose sympathetic innervation is related to that of the cervix. In this connection the writer makes mention of his experience with two patients afflicted with epilepsy since childbirth. Both had extreme cervical lacerations with superimposed cervicitis. No further epileptic seizures occurred after extensive trachelorrhaphy with excision of the old scars. The bearing of cervical trauma to malignancy is too big a question to be discussed here. At the present knowledge of the etiology of cervical cancer we cannot deny that cervical trauma can be a factor, and may, perhaps, be the most important factor in the production of hypertrophy ending in cancer.

Considering the great number of disturbances that may arise from cervical lacerations we should aim to prevent the healing by granulation of these tears and promote primary union of the torn surfaces by some method of repair, either as immediate trachelorrhaphy at the end of labor, or as intermediate trachelorrhaphy during the early puerperium.

With this aim before us we undertook to inspect every cervix at the end of the third stage of labor and immediately repair all evident cervical lacerations which extended into the connective tissue. This method of treatment was begun by us late in 1918, and was mainly carried out by the Junior Staff of the Division of Obstetrics and Gynecology of Stanford School of Medicine at Lane Hospital, under the supervision of the Senior Attending Staff.

In order to facilitate matters we established the following routine for our method of repair. Under the observation of strictest asepsis two Young's vaginal retractors were introduced into the vagina after the expulsion of the placenta, and after 1 c.c. of "aseptic ergot" had been given intramuscularly. By pressure over the fundus by an as-

sistant, the cervix was then easily brought into view and with the aid of two sponge holders the organ was fully and quite easily exposed. An ether sponge was next applied to the raw edges. (The use of ether blanches the tissue, and the torn connective tissue can more easily be distinguished by its pale appearance.) Tears less than 0.5 cm. in length were disregarded allowing for later contraction. All other tears, which usually occurred in the angles of the cervix, were approximated by single mattress sutures. (See Fig. 1.) This type of suturing did away with cutting into the epithelial edges of the lips by the sutures, in case severe edema should occur. So-called "40 day" chromic catgut No. 3 threaded on large Mayo needles was used as suture material. Great care was taken to tie the

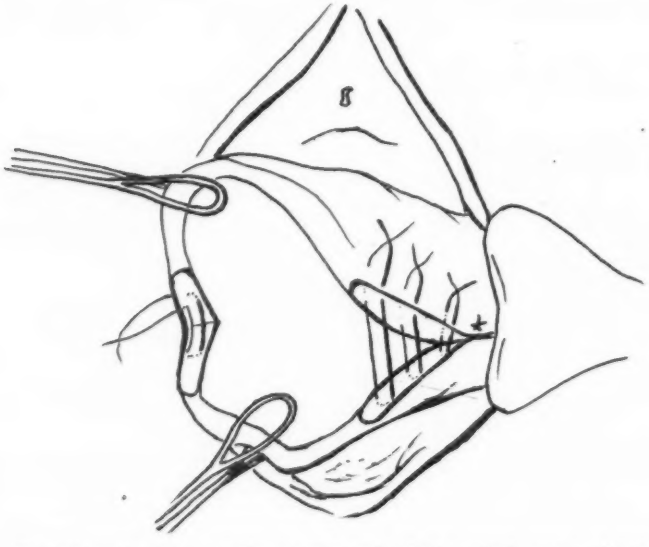

Fig. 1.—Semidiagram of a cervix at the end of the third stage of labor. Note the type of mattress suturing. Note that after tying the suture only the knot is visible and lies always on the anterior lip of the cervix. If edema should take place the knot will disappear under the epithelium. At no time will there be any cutting into the external repaired edges of the laceration, thus preventing transverse suture scars. Sutures can be laid wide apart and must be tied just firm enough to secure approximation, otherwise the buried portion of the suture will produce subcutaneous cutting.

sutures just tightly enough to evenly approximate the edges of the laceration, allowing for the slight amount of swelling that takes place soon after delivery. Primary union usually occurs within 24 to 48 hours after which the usefulness of the suture is problematic. Great care was taken at all times to avoid the narrowing of the normal outlet of the cervix in order to prevent any damming up of the lochial flow.

Sufficient time has elapsed since we undertook this work to report the end results of our cases for the first two years, covering 700 successive deliveries, in which number there is included a small group of

private patients. In reviewing the case histories of these 700 patients examined for cervical lesions at the end of labor, we found that it had been necessary to repair cervical tears in 73 patients, or slightly more than 10 per cent, which in the light of more recent work in our wards seems to be too low a percentage, and which must be blamed upon the difficulty of distinguishing these tears at the end of labor. We present our end results in Table I.

TABLE I

END RESULTS

	EXCELLENT	FAIR	FAILURE	TOTALS
Total	51 (70%)	15 (20.5%)	7 (9.5%)	73
Primipara	44 (83%)	8 (15.1%)	1 (1.9%)	53
Multipara	7 (35%)	7 (35%)	6 (30%)	20
Fever	8	5	1	14
Explained	6	3	0	9
Unexplained	2	2	1	5
Cervix				
Healed on dismissal	39	4	–	43
Healed on return	10	1	–	11
Slight lac. on return	–	6	1	7
Not healed	–	–	5	5
No return	2	4	1	7
Deliveries				
Normal	42	8	3	53
Abnormal	9	7	4	20
Average days in				
Bed	9	14	10	11
Hospital	13	17	12	14
Cervical aftertreatment	0	2	7	9

It is apparent that our results are best in primiparous women. The "excellent" results recorded are not confined to normal labors but include a number of forceps deliveries; just as the small percentage of "failures" includes several normal confinements. In primiparous women, failures become negligible. In multiparous women healing of immediate repairs is less successful because new tears follow the lines of old tears, exposing avascular areas of scar tissue which are not given to healing by simple approximation. They require excision of the scar, which we did not care to undertake at the period of repair, on account of the increased hazard of infection. We found it at all times difficult to distinguish between these recurrent tears and new tears. This greatly increases the difficulty in obtaining good results in multiparous women.

Our division of end results was based on the following criteria: "Excellent" we called any repair that was healed on dismissal from the hospital at the end of 10 or 12 days, or at the return of the pa-

tient four weeks after delivery. Under "fair" we classed those in which the repair had healed but where, on return of the patient, there were erosions or areas of granulation present which required a short after treatment to obtain a smoothly healed surface. As "failures" we counted those which had healed incompletely, or not at all.

With the exception of 7 patients of the 73 cases repaired at the time of labor, we had occasion to verify our results for each patient over a period of about one year. For the remaining seven we accepted the condition of the cervix on dismissal from the hospital as final.

In regard to morbidity, we found that 14, or 19 per cent, of the patients thus repaired developed fever above 100.2° F. It is only fair to state here that we included in this morbidity percentage, five patients in whom the rise above 100.2° F. occurred only once, and whose temperature thereafter remained relatively normal.

In analyzing the fever of these patients we were able to explain it in nine instances. In five we failed to find a satisfactory explanation, although in two the course and the curve of the fever suggested a deep seated phlebitis. Nevertheless, not having found a satisfactory explanation we must ascribe this morbidity to immediate trachelorrhaphy.

The fever of the remaining nine patients explained itself as follows:

Gonorrhea	1
Nonhemolytic streptococcus infection of the lochia (following abnormal deliveries)	3
Pyelitis and cystitis	1
Infection of the perineum	1
Postpartum hemorrhage (retained clot)	1
Retained placenta (saprophytic infection)	1
Old cervicitis and bartholinitis	1

Although, at first glance a morbidity of 19 per cent is exceedingly high, the total morbidity for the entire seven hundred confinements reviewed was not raised over the average morbidity observed in our wards during other years, varying between 11 and 14 per cent. Furthermore, it must be taken into consideration that nearly one-third of the deliveries in which cervical repairs were done were abnormal. This factor in itself tends to raise the morbidity of a small definite group of cases in any given number of confinements, while it will not affect the total morbidity percentage materially, when a number of years are compared.

In regard to hospitalization we learned that the average stay of all patients *repaired* was increased to fourteen days over the usual average of thirteen days. We cannot ascribe this entirely to imme-

diate cervical repair, but must again attribute it to the high percentage of abnormal deliveries in this group of patients, viz.: 27.5 per cent. We, therefore, find the longest hospitalization in the "fair" group where nearly one-half of the individuals were delivered abnormally. Although the number of abnormal deliveries in the patients under discussion was high, it constitutes the major portion of all abnormal deliveries for the 700 patients confined, and therefore the total percentage of interference remained within the normal average.

In regard to the percentage of patients requiring cervical repair the writer feels that it is by far too low. This must be attributed to lack of experience on the part of the Junior physician in recognizing lacerations.

In the light of more recent observations made in our wards, we feel that cervical repair should more nearly have approached the 40 per cent level. This subject will be taken up in a subsequent report on our experience with intermediate trachelorrhaphy.

In discussing the feasibility of immediate trachelorrhaphy it is only fair to quote the commonest objections which have been raised against this procedure. Outstanding above all is that of the increased danger of infection. We have shown that this has not been our experience, and we therefore can confirm the findings of Bubis, Reder, Davis and Skeel, who found that morbidity is not materially influenced if proper aseptic precautions are taken.

In regard to technic we agree to some extent with those who claim that the technic of immediate trachelorrhaphy is not devoid of difficulty, and that it requires a good deal of experience in recognizing cervical tears at the end of labor. In fact, this is the most difficult task in the entire procedure and can only be overcome by experience. On the other hand, we cannot agree with those whose objections are based upon difficulties arising from the cutting out of the sutures in the course of the average postpartum edema. We have succeeded in overcoming this difficulty by the method of suturing described. The objection raised by some that primary cervical repair prevents free drainage of the lochia is lacking in logic, because when such a repair is done properly by only restoring the outlines of a normal cervix, retention of lochia does not happen more frequently than is observed in any given number of confinements.

As a whole, we grant that the technic of cervical repair will always be cumbersome, if not difficult, unless carried out under proper surroundings with at least one, or still better, two assistants. In other words, obstetrical and surgical skill, assisted by a trained crew in a well conducted hospital, are absolute essentials for this work. It is a procedure not to be undertaken lightly, since more harm than good may be done unless every precaution of asepsis is observed.

That there is in this enlightened age still a group of those who contend that cervical lacerations will heal spontaneously without after effects, is surprising, if not deplorable. Just because a laceration is covered, in due time, with epithelium does not exclude it from giving rise to further disturbances. This contention is therefore no objection, but a lack of knowledge. To object to either immediate or intermediate cervical repair just because these lesions will heal in some fashion is short sighted, and defeats the aim of prophylactic medicine.

In this connection we must mention the "conscientious objector" who opposes cervical repair at labor on account of having to enter

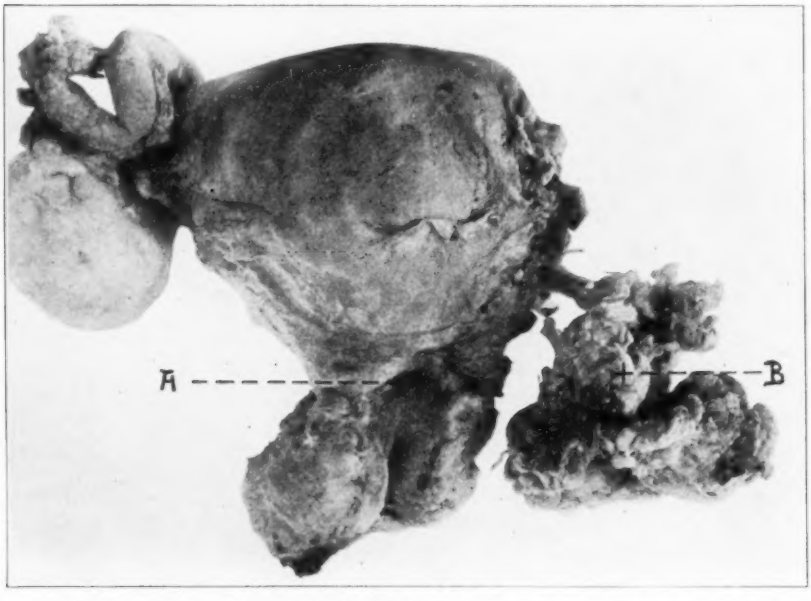

Fig. 2.—The uterus of a patient forty-one years old. (By courtesy of Dr. A. B. Spalding.)

A, Cervical tear which had extended above the internal os and continued through the left parametrium. The rent was spontaneously closed by a portion of the omentum (*B*), which at operation was found to extend well into the cervical canal. The patient had had a long, hard labor seventeen years previously without any undue bleeding. She came to operation on account of menorrhagia during the last four years. This is an excellent demonstration of a very severe cervical tear without bleeding.

the sacred precincts of the birth canal. This, in itself, is a fair objection. Nevertheless, we will find that the very same person offering this objection often will employ forceps at any provocation, and introduce a gauze roll into the birth canal every time he has to do a perineorrhaphy in order to keep his field blood free, without the slightest fear of consequences. I refrain from further comment.

That a cervix should not be repaired at once, unless serious bleeding had resulted from lacerations, is the objection of another group.

This attitude is based on faulty observation, and our textbooks are greatly to blame for this. It has been our good fortune to see a number of cervical tears, a few in our own wards immediately after instrumental deliveries and some others years after delivery elsewhere, where laceration extended deeply into the broad ligament, and in one instance through the broad ligament without producing hemorrhage of any consequence (Fig. 2). The reason for this is, that the peculiar fan-shaped arrangement of the connective tissue bundles of the cervix allows an unusual degree of retraction and contraction of these bundles. This physiologic function of the cervical tissue is, therefore, hemosthatic in character and explains why bleeding is comparatively rare even in the presence of deep tears. I have no doubt that without this marvelous provision of Nature, many women would have died from hemorrhage in the course of unskilled operative deliveries, or in the course of unattended stormy confinements.

In conclusion, I claim that immediate cervical repair at the end of the third stage of labor is feasible and advisable, if it is performed by an experienced obstetrician under ideal conditions and proper surroundings. It requires the development of a special technic and experience in recognizing cervical lacerations at this period. It is not devoid of danger, but when carried out with proper regard to asepsis will not materially influence morbidity. It may, or may not, slightly prolong the hospital stay of the patient depending entirely upon the type of preceding delivery. It gives excellent results in primiparous women, of whom 83 per cent do not require any further local treatment. It is unsatisfactory in multiparous women, whose previously torn cervix prevents healing on account of insufficient blood supply.

NOTE: The original survey of part of the material discussed here was made by Paul Herman Streichan, M.D., who incorporated his findings in a thesis for the degree of Doctor of Medicine at this Institution in 1919. His untimely death in Honolulu in 1920 has been greatly mourned by his friends and teachers. It is to the memory of Dr. Streichan, whose ardent spirit for knowledge has not been forgotten, that this publication is dedicated.

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STANFORD UNIVERSITY HOSPITAL.

THE ABDERHALDEN REACTION

An Attempt to Bring It Within the Realm of Practicability

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REALIZING that a practical serologic test for the diagnosis of pregnancy would be a boon to medicine, the writers determined to attempt to so modify the technic of the Abderhalden reaction as to overcome its manifest errors and to bring it within the realm of practicability. With this idea as a goal 131 sera were tested, 43 of them being from pregnant women, 15 from nonpregnant women, and 73 from males.

Great care was taken to minutely follow all the details of technic which Abderhalden insists are essential in order to get correct results. The blood was collected aseptically by the writers themselves into sterile test tubes and, after separating, the serum was removed from the clot and centrifuged at about 1500 revolutions per minute for fifteen minutes and then pipetted into another sterile test tube. Serum colored with hemoglobin was not used. All glassware and other materials were carefully cleaned and sterilized both before and after each time they were used, and nothing that entered into the test was ever allowed to be touched by hands after sterilization. Sterile distilled water was used throughout the experiments. No one else used the laboratory where the work was being carried out, and no other work was done in this laboratory during the course of the tests.

The dialyzing shells used in the test were the 16 by 50 mm. 579A, manufactured by Schleicher and Schüll of Düren, Germany. Before being used in the test they were tested with a 5 per cent egg albumen solution for impenetrability, and with 1 per cent peptone solution for penetrability. Those that permitted the solution of egg albumen to pass through, and those that did not permit the solution of peptone to pass through into the surrounding dialysate of sterile, distilled water after an incubation period of eighteen hours, were discarded. Falsely positive tests were always checked by retesting the shells with the albumen solution. The shells were sterilized by boiling in distilled water for one minute, and when not in use were kept immersed in jars of sterile, distilled water and covered with a layer of toluol.

The ninhydrin solution was prepared by dissolving 0.1 gm. of the drug in 10 c.c. of water. It was kept in the ice chest when not in use.

The placental antigen was most carefully prepared. Three or four normal placentas were secured and thoroughly washed in running tap water until entirely free from blood. All connective tissue was then carefully picked out along with any discolored particles and the remaining tissue again washed until it was snow white in color. It was then boiled with a hundred times its bulk of distilled water containing five drops of glacial acetic acid for ten minutes. This water was discarded and the coagulated placenta gone over with a sterile forceps to pick out any possible remaining small blood clots or discolored particles of tissue. The boilings were continued six times but without the acid, the water being discarded after each boiling. On the final boiling the tissue was just covered with water and the boiling continued for fifteen minutes. Five c.c. of this water was then tested with 1 c.c. of ninhydrin solution by boiling for sixty seconds, and if the tested water remained entirely free from color for thirty minutes the antigen was ready for use. It was then kept in the ice chest covered with water and a layer of toluol.

The actual test was performed by placing 0.5 gm. of dried antigen into a dialyzing shell and adding 1.5 c.c. of the serum to be tested. The shell was then placed in a glass cylinder measuring 35 by 95 mm. and 20 c.c. of water placed in the cylinder so that the shell was now about one third immersed in the water. The contents of the shell and the dialysate were then covered by a layer of toluol and the cylinder plugged with sterile cotton. A serum control was set up at the same time in exactly the same manner, except that the placental antigen was omitted, and a placental control in the same manner, except that 1.5 c.c. of water was substituted for the serum. These cylinders were then placed in an incubator at body temperature for eighteen to twenty-four hours and 10 c.c. of the dialysate then tested by boiling for sixty seconds with 0.2 c.c. of the 1 per cent ninhydrin solution. In the first forty-two tests the results were read as negative if the water remained uncolored at the end of thirty minutes, plus-minus if there was a slight color, and plus if the color was greater than plus-minus. It soon became apparent, due to the large number of positive reactions, that a greater accuracy in reading the results would be obtained if a color scheme were set up and the results read in a manner similar to the Wassermann test. Accordingly a color scale was made, and the remaining tests were noted as four-plus, three-plus, two-plus, one-plus, plus-minus and negative. Sloan[1] claims that the depth of color is no gauge to the amount of digestion that has occurred due to the ninhydrin being so easily affected by physical and mechanical factors. However, it seemed to the writers that there was a fairly constant increase in the depth of the color in those tests that should be positive over those that were falsely positive, but not certain enough to be of clinical significance.

TABLE I

THE ABDERHALDEN TEST

SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST
1	M	–	+	36	M	–	–	80	M	–	+3	106	F	9	+4
2	F	–	±	37	F	–	+	81	M	–	+3	107	F	9	+3
3	F	–	±	43	M	–	±	82	M	–	+2	108	M	–	+3
4	M	–	±	44	M	–	+2	83	M	–	+3	109	F	9	+3
9	F	6	+	45	M	–	+1	84	M	–	+2	110	F	9	+3
10	F	8	+	46	F	–	+2	85	M	–	+3	111	F	9	+3
11	F	8	+	47	F	–	+2	86	M	–	+3	112	F	9	+3
12	F	8	+	48	M	–	+3	87	M	–	+2	113	F	7	+2
13	M	–	+	49	M	–	+1	88	M	–	–	114	F	8	+4
14	F	9	+	56	M	–	+2	89	M	–	+3	115	M	–	+2
15	F	–	+	57	M	–	+2	90	M	–	+3	116	M	–	+4
16	M	–	–	58	M	–	+2	91	M	–	+2	117	F	8	+3
17	M	–	–	59	M	–	+2	92	M	–	+1	118	F	7	+3
18	F	9	+	60	M	–	+3	93	M	–	+2	119	F	–	+1
19	M	–	+	61	M	–	+2	94	M	–	+2	120	F	–	+2
21	M	–	+	65	M	–	+3	95	F	9	+3	121	F	–	–
22	M	–	+	66	M	–	+3	96	F	9	+3	122	F	–	+2
23	F	–	+	67	M	–	+3	97	F	9	+2	123	F	6	+2
24	F	–	+	72	M	–	+2	98	F	9	+2	124	M	–	+3
25	F	8	+	73	M	–	+3	99	F	9	+4	125	F	9	+3
29	F	9	+	74	M	–	+2	100	M	–	+2	126	F	9	+4
31	F	9	+	75	M	–	+3	101	M	–	+1	127	F	9	+4
32	F	9	+	76	M	–	+3	102	M	–	+2	128	M	–	+4
33	F	9	+	77	M	–	+2	103	M	–	+2	129	M	–	+3
34	F	9	+	78	M	–	+3	104	M	–	+3	130	M	–	+4
35	F	9	+	79	M	–	+2	105	M	–	+2	131	M	–	+3

Controls were negative. The figures in the columns headed "pregnant" indicate month of gestation.

Bronfenbrenner's[2] modification of the Abderhalden technic was carried out on 55 sera, 26 from males, 7 from nonpregnant women, and 22 from pregnant women. All were positive except two of the sera from males.

The technic consists of placing together in a sterile test tube 1.5 c.c. of the serum to be tested and 0.5 gm. of the placental antigen and refrigerating for eighteen to twenty-four hours at 6° C. Five c.c. of water is then added and the tube centrifuged for ten minutes. The water and serum are then pipetted off and the tube again centrifuged with 5 c.c. of water added. This water is again pipetted off, the placental antigen dried between sheets of sterile filter paper, and a test set up by the regular Abderhalden technic using the sensitized antigen and 1.5 c.c. of male guinea pig serum. The supposed specific enzyme of the pregnant serum is expected to unite with the supposed specific properties of the antigen, so that the latter can then be digested by the normal, nonspecific enzymes which are present in any serum.

TABLE II

THE BRONFENBRENNER TECHNIC

SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST	SERUM	SEX	PREGNANT	TEST
1	M	–	±	31	F	9	+	50	F	8	+4
2	F	–	+	32	F	9	+	51	F	8	+4
3	F	–	+	33	F	9	+	52	F	9	+3
4	M	–	+	34	F	9	+	53	F	8	+3
5	M	–	+	35	F	9	+	54	F	8	+4
6	M	–	+	36	M	–	+	55	F	7	+4
7	F	–	+	37	F	–	+	58	M	–	+4
8	M	–	+	38	F	6	+	59	M	–	+3
9	F	6	+	39	F	9	+	60	M	–	+4
10	F	8	+	40	F	9	+	61	M	–	+3
11	F	8	+	41	F	9	+	62	M	–	+3
12	F	8	+	42	F	9	+	63	M	–	–
20	M	–	–	43	M	–	+3	64	M	–	+3
25	F	8	+	44	M	–	+2	68	M	–	+3
26	M	–	+	45	M	–	+3	69	M	–	+3
27	M	–	+	46	F	–	+3	70	M	–	+3
28	F	–	+	47	F	–	+2	71	M	–	+3
29	F	9	+	48	M	–	+3				
30	M	–	+	49	M	–	+4				

Controls were negative. Figures in the columns headed "pregnant" indicate month of gestation.

A third problem attempted was to so reduce the dose of the serum to be tested that falsely positive results would be eliminated while at the same time true positive results would be maintained and give a reliable reading. Twenty-one sera, eleven from pregnant women and ten from males, were tested by the regular Abderhalden technic but with decreasing doses of the serum. All of the positive readings

TABLE III

THE ABDERHALDEN TECHNIC WITH SMALLER DOSES OF SERUM

SERA FROM PREGNANT WOMEN					SERA FROM MALES			
SERUM	MONTH OF GESTATION	1.5 C.C. OF SERUM	1.0 C.C. OF SERUM	0.5 C.C. OF SERUM	SERUM	1.5 C.C. OF SERUM	1.0 C.C. OF SERUM	0.5 C.C. OF SERUM
96	9 mo.	+3	+2	+1	85	+3	+1	±
111	9 mo.	+3	+3	+1	86	+3	+2	−
112	9 mo.	+3	+1	±	87	+2	+1	±
113	7 mo.	+2	+1	+1	89	+3	+1	−
114	8 mo.	+4	+3	−	91	+2	+1	−
117	8 mo.	+3	+1	−	92	+1	±	±
118	7 mo.	+3	+1	−	93	+2	+1	−
123	6 mo.	+2	+1	−	94	+2	+1	−
125	9 mo.	+3	+2	−	102	+2	+1	−
126	9 mo.	+4	+2	±	103	+2	+1	−
127	9 mo.	+4	+2	−				

Controls were negative.

were reduced in an exactly similar manner so that it was evident that 1.5 c.c. of serum was the irreducible minimum dose for the test.

An attempt to destroy the normal ferments by heating the sera was made. Twenty-nine sera were used in this experiment, twenty-four of them being from males and five from pregnant women. Twenty sera were heated in a water-bath at 55° C. for thirty minutes, fifteen at 55° C. for thirty minutes and then at 60° C. for thirty minutes, six at 60° C. for thirty minutes, and six at 60° C. for sixty minutes. The destruction of ferments in the sera from the pregnant women was about equal to the destruction of the ferments in the males, so that the falsely positive results could not be eliminated in this manner. The regular Abderhalden technic was used.

The fifth problem was an attempt to get rid of nonspecific ferments by dialyzation. Three tests were set up on each serum by the regular Abderhalden technic (the layer of toluol being omitted) and were then placed in the refrigerator at 6° C. At the end of twenty-four hours one cylinder was removed and labeled No. 1. The dialysate was then tested in the usual manner with the ninhydrin solution and the shell removed to another cylinder. Twenty c.c. of sterile distilled water were added to the cylinder as in the regular test, the water and contents of the shell covered with a layer of toluol, the cylinder plugged with cotton and placed in the incubator at body temperature for eighteen to twenty-four hours, and the dialysate then tested. At the end of the second twenty-four hours the procedure was repeated on cylinder No. 2, and at the end of the third twenty-four hours on cylinder No. 3.

Six sera were tested, three of them being from males and three from pregnant females. The unsatisfactory results would indicate

TABLE IV

THE EFFECT OF HEAT ON THE ABDERHALDEN TEST

SERUM	SEX	REGULAR TEST	55° FOR 30 MIN.	55° FOR 30 MIN. THEN 60° FOR 20 MIN.	60° FOR 30 MIN.	60° FOR 60 MIN.	SERUM	SEX	PREGNANT	REGULAR TEST	55° FOR 30 MIN.	55° FOR 30 MIN. THEN 60° FOR 30 MIN.	60° FOR 30 MIN.	60° FOR 60 MIN.
49	M	+1	±				79	M	–	+2	–	–		
56	M	+2	+2			–	80	M	–	+3	+1	–		
57	M	+2		+2		+1	81	M	–	+3	±	–		
58	M	+2	+1	–			82	M	–	+3	+2	–		
59	M	+2	±				83	M	–	+3	+2	±		
60	M	+3	–				84	M	–	+2	+1	±		
61	M	+2	–				85	M	–	+3			–	
65	M	+3	+1	+1			86	M	–	+3			+1	–
66	M	+3	–				87	M	–	+2			±	
67	M	+3	+2	+1			95	F	9	+3	+1	±	+1	±
72	M	+2	+1	–			96	F	9	+3	+1	–	+1	–
73	M	+3	+1	±			97	F	9	+2				–
74	M	+2	+1	±			98	F	9	+2			+1	–
75	M	+3	+1	+1			99	F	9	+4	+1			–
78	M	+3	±	–										

Controls were negative.
The figures in the columns headed "pregnant" indicate month of gestation.

TABLE V

THE EFFECT OF DIALYZATION ON THE ABDERHALDEN TEST

SERUM	SEX	PREGNANT	REGULAR ABDERHALDEN TEST	DIALYSATE NO. 1	ABDERHALDEN NO. 1	DIALYSATE NO. 2	ABDERHALDEN NO. 2	DIALYSATE NO. 3	ABDERHALDEN NO. 3
115	M	–	+2	–	–	–	–	±	–
116	M	–	+4	±	–	–	–	–	–
123	F	6	+2	±	+2	–	±	–	±
124	M	–	+3	+2	+1	±	±	–	±
125	F	9	+3	–	+1	–	+1	±	+1
126	F	9	+4	–	+1	–	+1	±	+1

Controls were negative. The numbers in the column headed "pregnant" indicate the month of gestation.

TABLE VI

THE ABDERHALDEN TEST SHOWING THE EFFECT OF THE ABSORPTION OF FERMENTS

SERUM	SEX	PREGNANT	ABD. TEST PLAC. ANTIG.	ABD. TEST B. H. ANTIG.	INCUBATED WITH B. H. ABD. WITH PLAC.	INCUBATED WITH B. H. ABD. WITH B. H.	INCUBATED WITH PLAC. ABDER. WITH PLAC.	INCUBATED WITH PLAC. ABDER. WITH B. H.
100	M	——	+2	+2	±			
101	M	——	+1	+1	±			
102	M	——	+2	+1	±			
103	M	——	+2	+2	±			
104	M	——	+3	+3	±			
105	M	——	+2	+1				
106	F	9 mo.	+4	+2	+1			
107	F	9 mo.	+3		+2			
108	M	——	+3		+3			
109	F	9 mo.	+3	+2	+1	±		
110	F	9 mo.	+3	+3	+2	+1		
111	F	9 mo.	+3	+2			+1	
112	F	9 mo.	+3	+1	+1		–	
113	F	7 mo.	+2	+1				
114	F	8 mo.	+4	+4	+2			
117	F	8 mo.	+3					+2
118	F	7 mo.	+3					+1
123	F	6 mo.	+2					–
125	F	9 mo.	+3				+2	
126	F	9 mo.	+4				+2	
127	F	9 mo.	+4				+2	
128	M	——	+4			+1	+1	
129	M	——	+3			±	±	
130	M	——	+4			+1	+1	
131	M	——	+3			+1	+1	

Controls include a beef heart control as well as the usual serum and placental controls. All were negative.

that the antigen is probably sensitized and takes up all the ferments from the serum.

The final experiments endeavored to remove the nonspecific ferments with a beef heart substratum and to establish the specificity of the placental antigen. The beef heart substratum was prepared

in exactly the same manner as the placental antigen, and kept in the ice chest covered with sterile distilled water and a layer of toluol. In this series, in addition to the regular Abderhalden test, a test was carried out on each of thirteen sera using the regular technic but substituting beef heart for the placenta. Eight of these showed a slight reduction in the positiveness of the result.

Twelve sera were tested by placing 2.0 c.c. in a sterile test tube with 0.5 gm. of beef heart and incubating at body temperature for two hours. The tube was then centrifuged, the serum pipetted off, and a regular Abderhalden test set up with the placental antigen. This gave a marked reduction in the positiveness of the test in all the sera.

Six sera were tested as above, except that the Abderhalden test was set up with the beef heart substratum. A marked reduction in positiveness again occurred in all the sera.

Nine sera were tested as above, incubating the sera with placenta and setting up the test with placenta. Three sera were tested by incubating with placenta and setting up the test with beef heart. The results here were very little different from the preceding.

Two c.c. were used rather than the standard 1.5 c.c. to make up for the small loss in centrifuging with the substratum and transferring to the shells.

CONCLUSIONS

While the natural ferments present in serum are somewhat increased there is no evidence that a specific ferment exists in pregnancy.

The tests on the serum of pregnant women were uniformly positive, but the large number of positive results on the sera of men and nonpregnant females proves the test of no value for the diagnosis of pregnancy.

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THE NEWBORN SERVICE IN A UNIVERSITY HOSPITAL

By Leonard T. Davidson, M.D., and Otto S. Krebs, M.D.,
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THE purpose of this paper is to describe a plan of co-operative supervision of the nursery of a maternity service and to point out what we believe to be some of the advantages of such management.

About two years ago a plan was worked out between the obstetrical service of Barnes Hospital and the Pediatric Department of the St. Louis Children's Hospital, both under Washington University, whereby the newborn infant through the period of its hospital stay of two weeks should be under the joint observation of both departments. This idea was not new for it had been in successful operation abroad (Vienna) and in at least two university hospitals in this country (Minnesota, California). There are a number of reasons why such dual control should be of advantage. The baby as a separate individual is deserving of the same specialized and efficient care which the mother has had before and after delivery. The baby is not and never has been the primary interest of the obstetrician, nor should he be. The obstetrician is essentially a surgeon and his time and interests are to so large an extent taken up by his own specialty that it is not to be expected that he could give much of either to the baby and its needs. It has been said by many opponents of this dual scheme that the infant through the early weeks is practically "fool proof" and will thrive no matter what happens. This is probably true of the more primitive peoples, but as our civilization becomes more and more complex with all the varied cross influences on the human being, so the deviations from the normal become multiplied, and nowhere is this more apparent than in childbirth and all its attendant circumstances. It has been quite evident that on the colored division of the obstetrical service the infant is more hardy, fewer complications in the newborn period arise, the breast supply is more abundant and fewer artificial feedings are necessary. We have made great strides along the line of prenatal care. Should this not be complemented in the early postnatal weeks by the very best of knowledge and judgment that is at our disposal?

This is not a plea for handing over the newborn infant wholly to the pediatrician. Its relation to the mother is still so close that only by constant consideration of her condition postpartum, both mental and physical, can the infant's best good be obtained. The ideal ar-

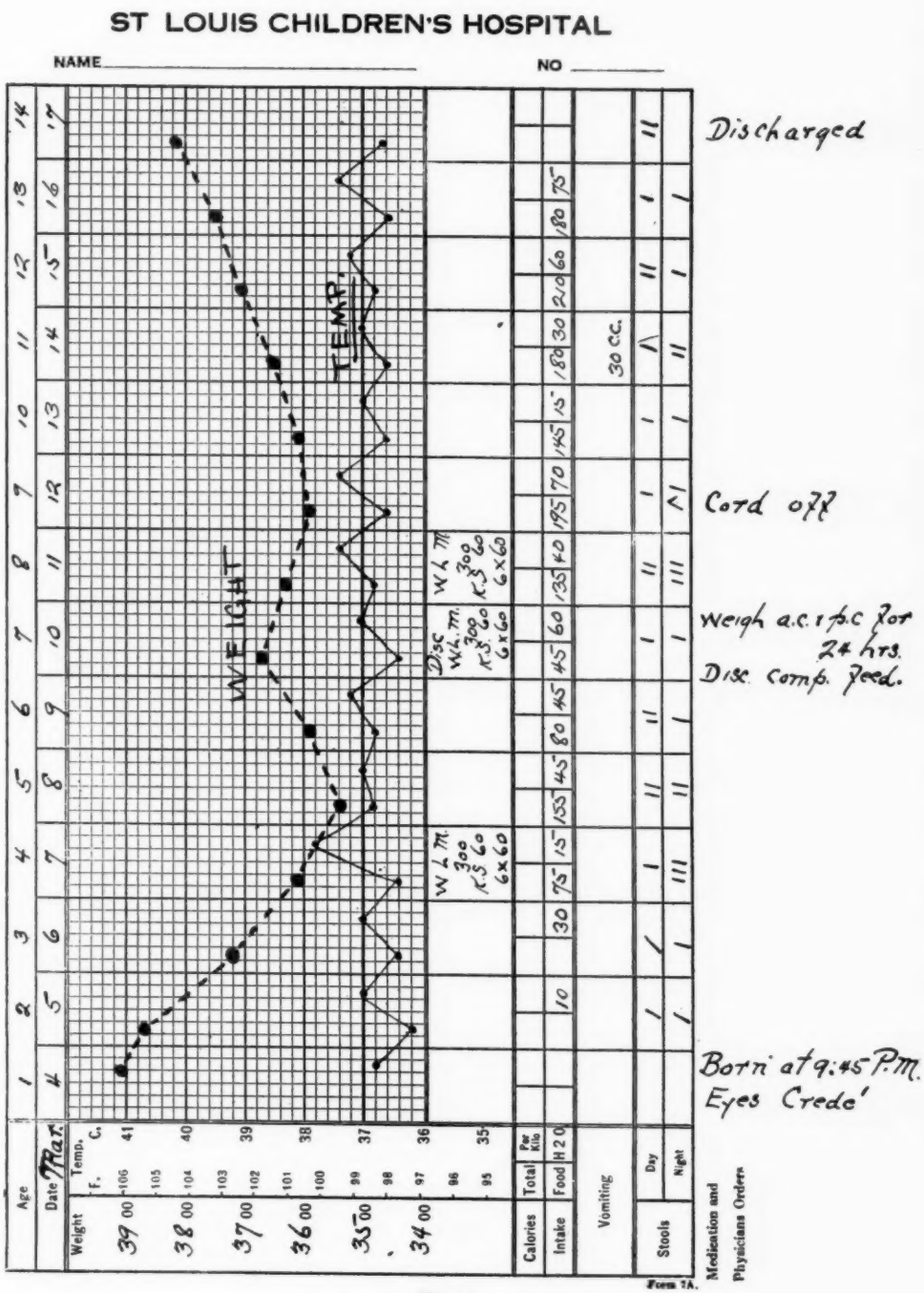
ST LOUIS CHILDREN'S HOSPITAL
NAME
NO
WEIGHT
TEMP.
Discharged
Cord off
Weigh a.c. & p.c for 24 hrs.
Disc. comp. feed.
Born at 9:45 P.M.
Eyes Crede'
30 c.c.
Form 7A.

Fig. 1.

rangement would be one in which the obstetrician and pediatrician, or a representative from each service, had joint responsibility for and supervision of the nursery.

It was, therefore, with these factors in mind that the newborn service at the Washington University Clinic was organized along the following lines: The newborn infant is formally admitted to the hospital as a patient, is given a regular hospital number, and the records and charts are kept as for any other patient. The temperature and weight chart conforms in every detail with that used on the Infant Ward of the Children's Hospital. This has appropriate ruling and spacing for the daily record of weight, temperature, food intake in kind and caloric value, water intake, the amount of vomiting, the

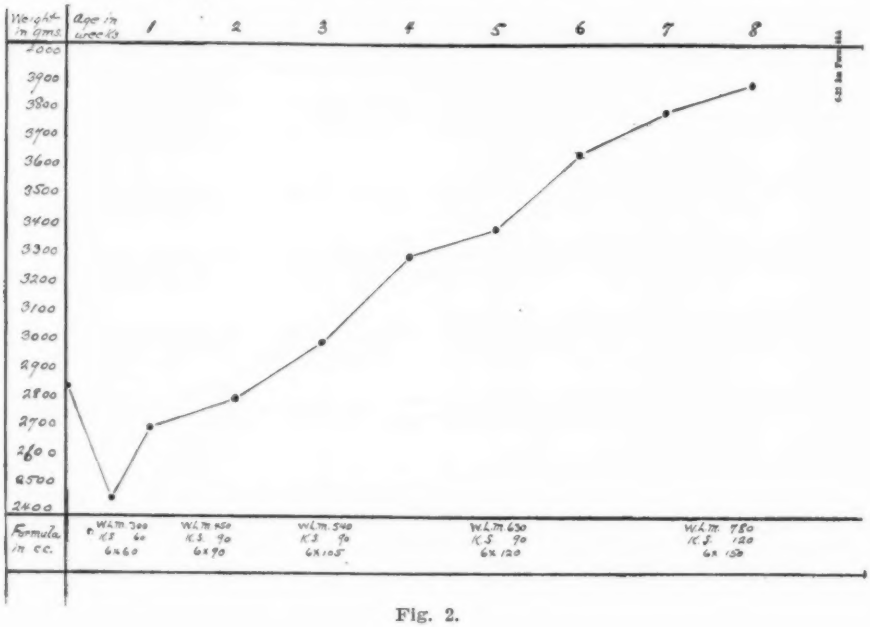

Fig. 2.

number and character of stools, and below a space for doctor's orders. (Figs. 1 and 2.)

The direct responsibility lies in the hands of the obstetrical interne. He does a complete physical examination which he records, together with a statement of the history of labor and facts of importance in the family history. Joint rounds are made daily in the nursery by the obstetrical and pediatric residents. The interne joins these rounds whenever possible, discussing the cases, both infants and mothers, with the residents. There is present also the nurse in charge of the nursery. By the time rounds are made she has weighed and bathed the infants, summarized the food and water intake, the stools, the vomiting and so forth. She is able to give valuable information as

to the baby's general activity, its action at the breasts, the condition of the breasts, the milk supply, any bleeding that may have occurred and other important points.

The physical examination is checked by the pediatrician and a note made in agreement or disagreement with that of the interne. The charts are studied, comparing food intake with weight lost or gained. If weight is lost, the causes for the loss are sought for in both mother and infant. Such factors as delayed secretion, sore or fissured nipples, depressed nipples, turgidity of the breasts, and of course, actual insufficiency of secretion are all considered. On the part of the infant the usual causes of poor nursing are sought for or ruled out. These causes include congenital anomalies, weakness, nasal obstruction, birth hemorrhage, idiocy, etc.

The nursing routine of the normal newborn infant is briefly as follows: it is put to the breast about twelve hours after delivery and thereafter every four hours. The breasts are alternated. Feeding hours are 5 A.M., 9 A.M., 1 P.M., 5 P.M., 9 P.M., and 1 A.M. Water is given midway between feedings through the day only.

Premature infants, very small or weak infants, and those suffering from intracranial injury, malformations of the heart, atelectasis, and so forth, are not put to the breast during the first few days of life, but are kept as quiet as possible until the mother's secretion is established, and thereafter until their condition warrants handling. The following routine has been found sufficient for premature infants with birth weights above 1500 grams. The infant is put into a room by itself, the temperature is kept at approximately 80 to 85° Fahrenheit. Electric heaters under the crib and hot water bottles about the baby are used to supplement the usual heating devices. Instead of swathing, the infant is dressed in the ordinary woolen shirt and stockings and soft diaper and wrapped in a woolen blanket outside which hot water bottles are placed. The infant is not bathed but is oiled daily to conserve its own body heat and to prevent drying of the skin. It is not put to the breast until it is able to nurse well from a bottle. Up to this time various means of feeding are used. An attempt is made to feed with a medicine dropper but if the infant will not swallow or vomits the feeding regular gavage is instituted. A premature infant will often retain a greater amount of food given by gavage than by medicine dropper or nipple, because both of the latter methods seem to excite a vomiting reflex in the pharynx. They furthermore favor aerophagia. The mother's breasts are expressed manually at regular nursing intervals to stimulate secretion. The expressed milk is fed to the baby by one of the above methods.

When a normal infant does not gain after the initial loss, or continues to lose weight, if he is nursing strongly, we do one of two

things to ascertain the amount of breast supply. We weigh the baby before and after feeding, or we express the breast after nursing, measure the amount and feed it to the baby. Sometimes it is best to combine these two methods. One or both will usually show where the trouble lies.

If there is a proved deficiency in the breast secretion, we do not hesitate to give the baby a complemental formula, even though this be necessary for a few days only. In complemental feeding a formula is given immediately following each breast nursing in contradistinction to supplemental feeding in which the formula supplants one or more breast feedings. Complemental feeding is preferable because the regular nursing efforts of the child best stimulate breast secretion. Complemental feedings are given without hesitation because we believe that this newborn period is a very important one from the standpoint of nutrition. Pediatricians the country over are coming to feel that babies of all ages, normal and otherwise, have been largely underfed in the past, and that they need and can use in the proper form more calories than it has previously been the custom to feed. This is true during the newborn period, as well as in later infancy. A large percentage of newborn babies in this clinic are given complemental feedings at some time in the newborn period. This is simply in line with the newer scientific knowledge of infant nutrition and metabolism. The complemental feeding is not kept up beyond the time when it seems that the breast is sufficient, as evidenced by the refusal of the formula, or continued gain in spite of its withdrawal for twenty-four to forty-eight hours. Sometimes the formula is needed only for four or five days. Sometimes it can be discontinued soon after discharge from the hospital. The return of the mother to normal conditions of health, routine and environment often serves to increase the breast secretion up to the amount sufficient for the infant, but we believe that in the early days of adjustment of mother and child to new conditions any insufficiency of breast milk should be complemented by a suitable formula, in order that the child may be assured of adequate food.

Obstetricians as a rule are loath to use artificial feeding unless absolutely necessary, and then they tend greatly to underfeed. The standard formula for a newborn infant in the first two weeks has long been of this order: one-third milk, two-thirds water, with one-half ounce of cane sugar, dextri-maltose or lactose. In using ordinary sweet cow's milk dilutions we have used half-and-half dilutions in the first week, increasing to two-thirds milk after the seventh to tenth day. A larger percentage of sugar, and, therefore, more calories can be given if some form of dextrin-malt sugar is used; as this ferments less easily than other sugars. The simplest and cheapest form of malt sugar is ordinary Karo corn syrup, which contains one

ounce by weight of sugar to the fluid ounce of syrup. This is used in 50 per cent dilution to facilitate mixing.

The use of Bulgarian, or lactic acid milk as infant food has become increasingly popular in the last few years, at least in older infants. On the infant wards of the St. Louis Children's Hospital it has practically displaced sweet cow's milk in the feeding of sick infants. We have been feeding lactic acid milk to newborn infants for the past year both wholly and complementally. At first we used this Bulgarian milk in the same dilutions as sweet milk but we have found it so well tolerated that we now use it undiluted from birth. Its efficacy seems to be due mainly to its lowered buffer action. The formula used as a routine in the nursery is as follows: Whole lactic acid milk, 10 oz.; 50% Karo Corn syrup solution, 2 oz. The whole lactic acid milk formula is prepared as follows: The commercial syrup is diluted with an equal amount of boiled water. Two ounces of this solution is added to 10 oz. of whole lactic acid milk as it comes from the dairy, and the whole divided into 6 feedings of 2 oz. each. There is no cooking required. The milk is warmed to body heat by immersing the bottle in warm water just before feeding.*

Two case reports are given to illustrate the methods used.

1. Baby Hahn, a normal full term infant of 8.5 lbs. was given a formula on the fourth day (see Fig. 1) because the breast secretion had not begun. This was discontinued on the seventh day because there seemed to be adequate breast milk, and the baby was not taking the formula, but after two days the formula was again given because by weighing before and after breast feeding it was found that the baby was getting very little from the breast. The weight curve from then on to discharge was normal.

2. Baby Brown, a normal full term infant weighing six pounds, was artificially fed from birth because its mother was operated upon immediately postpartum for empyema. The baby was started on the third day on a formula of undiluted lactic acid mild 10 ounces, 50% Karo syrup 2 ounces, six feedings of 2 ounces. He took this without vomiting, diarrhea or other disturbances with a gradual gain in weight. This was increased in amount and sugar content until at discharge at the age of eight weeks the baby was taking the following formula: Undiluted lactric acid milk 25 ounces, 50% Karo syrup 5 ounces, (i.e., 2.5 ounces of sugar) 6 feedings of 5 ounces. The discharge weight was 9 pounds, a gain of three pounds in eight weeks. (See Fig. 2.)

In order to arrive at a conclusion as to the advantages of the plan outlined above a comparison has been made of 100 unselected consecutive cases from the ward nursery before the adoption of the new regime and 100 unselected consecutive cases since the new plan was adopted. The results are summarized in Chart I. The routine complemental feeding under obstetrical supervision alone was usually one-third cow's milk, two-thirds water with half an ounce of cane sugar or dextri-maltose. The first point of interest is that under the

*For more detailed explanation of the rationale of lactic acid milk in infant feeding see Marriott, Jour. Am. Med. Assn., Oct. 18, 1919, lxxiii, 1173. Marriott and Davidson, Jour. Am. Med. Assn., (in press).

new regime of joint supervision and in line wth the policy of giving the newborn infant adequate food, a much larger percentage of infants have been given complemental feedings than was formerly the case. At no time has there been any attempt to forestall initial loss except where it has been continued beyond the normal limits due to delayed lactation or other causes, and in cases of prematurity, nor have we tried to actively force feeding by withdrawing an infant from the breast fed class into the artificially fed. The idea has simply been to give adequate food. Analyzing the figures further as to birth weights and discharge weights it is seen that under the old regime the breast fed infants at discharge lacked on an average 111 grams of their birth weights, those complementally fed 201 grams of their birth weights, or an average deficit for the whole series of 138 grams. Under pediatric supervision and the feeding of undiluted lactic acid milk the breast fed infants lacked 43 grams of their birth weight at discharge, the complementally fed 80 grams, or an average deficit of 63 grams for the series. In other words, the deficit has been decreased by approximately one-half. In the infants who required complemental feeding the gain per day has been practically doubled, 36.1 grams per day as against 19.9 grams.

CHART I

	OBSTETRICAL CONTROL		DUAL CONTROL	
Number of Cases	100		100	
Breast Fed Exclusively	71		46	
Complemental Feeding	29		54	
	BREAST.	COMP.	BREAST.	COMP.
Average Birth Weight	3405	3087	3463	3307
Average Discharge Weight	3294	2886	3420	3227
Average Deficit (Gm.)	111	201	43	80
Average Deficit—Breast and Complemental Combined	138		63	
Number of Days on Formula	8.9		7.2	
Average Gain per Day (Gm.)	19.9		36.1	

We have in the Washington University Dispensary a Well Baby Clinic which is a unit in the system of municipal feeding clinics of the City of St. Louis. This clinic is conducted by the resident of the St. Louis Children's Hospital—the same man who has supervision of the newborn service in the hospital. All babies discharged from the nursery are seen by him in the clinic at least once, and in most cases twice, before they are sent to the neighborhood clinics. Those entirely breast fed return at the age of six weeks, at which time the mother is also examined in the obstetrical clinic and discharged if her condition is satisfactory. Those complementally or artificially fed are seen one week after discharge and thereafter as often as is deemed necessary. The mothers are assisted to the clinic, if necessary, by a special social worker for infants. This worker, who is also

a graduate nurse, regularly visits the home on the morning after the baby is discharged from the nursery, to direct and assist the mother in making up the first formula. Thus continuity of observation and treatment is maintained.

This plan of cooperative supervision of the newborn continued after discharge in the obstetrical and well baby clinic has been found most helpful and advantageous to mother and child. It has served the further academic purpose of acquainting the resident staff of the Children's Hospital with the care and management of the newborn infant, a service which finds no place in the ordinary children's hospital. Out of this has developed during the past school year a short course of six weekly lectures and demonstrations to fourth year medical students. This is given during the time the students are doing their practical obstetrical ward and outpatient work and just precedes or follows their fourth year practical work in pediatrics and infant feeding. This short course thus forms a link in correlating the work in obstetrics and pediatrics which has not heretofore been possible. The course is planned generally to emphasize to the student the more important factors and details in the care and management of the newborn and in the diagnosis and treatment of abnormal conditions arising during that period. No attempt is made to cover the whole field in detail; the following important topics are taken up:

1. Immediate care of the newborn infant, including methods of resuscitation, ligating of the umbilical cord, toilet of the skin, prophylactic treatment of the eyes, suitable clothing, etc. Treatment of chemical and bacterial conjunctivitis. Care of the umbilical stump, treatment and prevention of umbilical hernia.

2. Diagnosis and treatment of birth injuries, especially intracranial injuries and intracranial hemorrhage.

3. The physiology of lactation. Difficulties in nursing on the part of mother and infant. Care of the breasts during pregnancy and the puerperium, and treatment of abnormal conditions of the breasts and nipples. Routine and technic of breast feeding. Food and water requirements of the newborn, etc.

4. Indications for complemental feedings and consideration of kind, quantity and routine of administration.

5. Care of the premature infant.

6. Discussion of such conditions as icterus neonatorum, transitory fever, pylorospasm, skin diseases, exanthemata, hemorrhagic disease of the newborn, atelectasis, congenital malformations, syphilis and tuberculosis.

OBSERVATIONS ON THE VIABILITY OF THE MAMMALIAN OVUM*

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In January, 1921, the writer performed the following experiment in order to determine the time required for the opossum ovum to traverse the fallopian tube. In the experiment the successful attempt was made to "mark" an egg and recover it after a given time from the uterus.

A suspension was made in physiological saline solution of *Ascaris lumbricoides* from pigs. To free the eggs of their gelatinous matrix, the worms were killed and allowed to decay for two or three weeks. The exceedingly resistant eggs of course remained intact (Fig. 3) and were thoroughly washed in successive changes of salt solution.

The next step was to find a female opossum in heat or immediately after ovulation. This was rendered relatively easy by the employment of Stockhard and Paponicolaou's[10] vaginal smear method of diagnosing the events of the oestrous cycle. In the opossum at oestrus the smear shows a pure culture of cornified cells without admixture of leucocytes or epithelial cells. At 5:10 P. M., Jan. 12, a laparotomy was performed on animal No. 566, which was found to have just ovulated. About a cubic centimeter of the suspension of round-worm ova was placed under the fimbriated end of each oviduct. At 5:00 P. M. the next day one uterus† was removed. It contained eggs with clear albumen and shell membrane and the ova in the center of the eggs were already slightly degenerated. Sixteen hours later the animal was killed and the remaining uterus removed. It contained eggs similar to the first batch, but somewhat fragmented and more degenerated; and one of the eggs had within the albumen layer an Ascaris egg (A, Fig. 1). This egg was therefore recovered forty hours after the Ascaris eggs were injected. But it reached the uterus in less than twenty-five hours; for the ova of the opossum are always discharged from the two ovaries at the same time, reach the uteri at the same time, and are identical in appearance, whether fertilized or unfertilized. No exceptions have been noted among the hundreds of batches and thousands of eggs removed from these animals by the writer.[6] It therefore follows that the tubal journey is made in about twenty-four hours. Among mam-

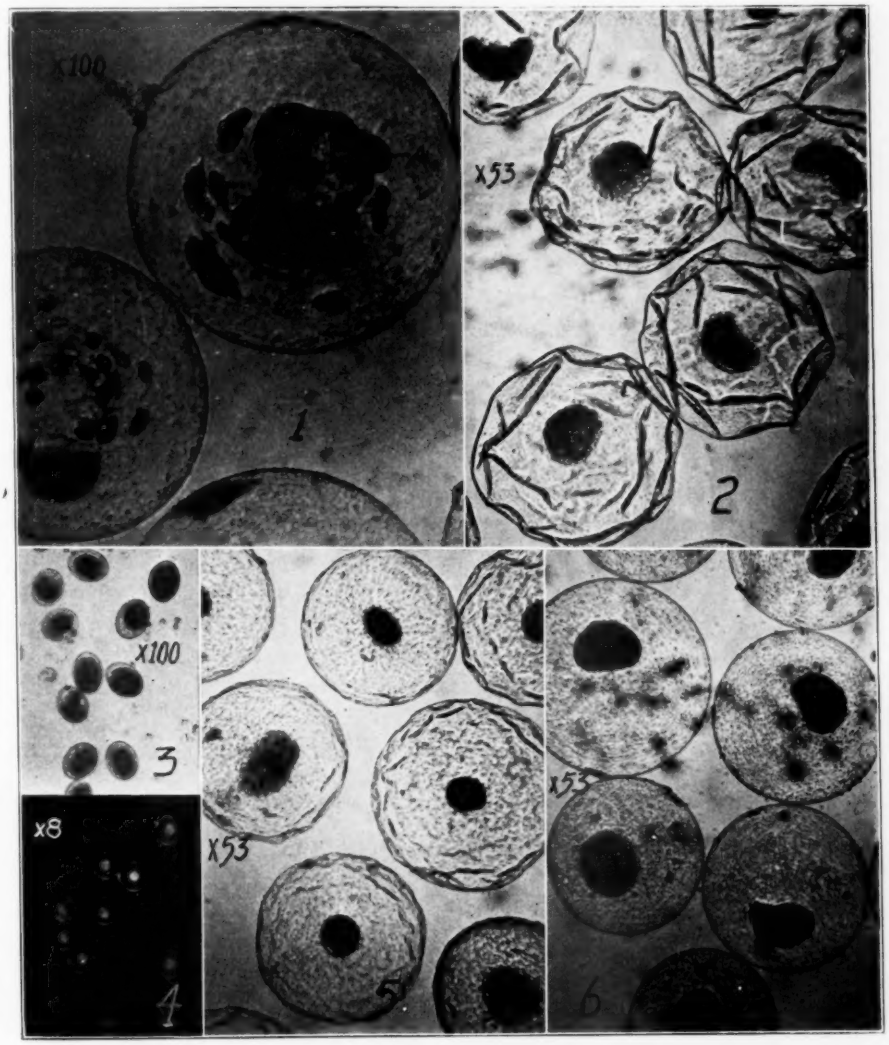
*Contribution from the Department of Zoology, the University of Texas, No. 164.

†Marsupials have two uteri (uterus duplex), hence the generic name Didelphys for opossum. Atavistically this condition occasionally occurs in man.

The eggs of marsupials possess an albumen layer and a shell-membrane, homologues of similar structures in the eggs of birds and reptiles.

mals the opossum holds the record for the rate of passage of the eggs through the oviduct. This short period of a single day is sufficient, too, to cause generative changes to be noted within the ovum.

The writer has considerable further data corroborative of the findings described above. Several examples must suffice.



Figs. 1—6.

No. 521 exhibited ripe, bulging follicles on Jan. 21 when a laparotomy was performed. 42 hours later eggs considerably degenerated were found in the uteri (Fig. 4).

No. 837 was seen to copulate at 4:00 A. M. Jan. 23; at 3:00 P. M. the next day 17 eggs were removed from the left uterus and 3 from the tube. These eggs were already much affected by degenerative changes (Fig. 2). In this case it is highly probable that copulation had taken place too late for fertilization.

No. 762. Jan. 25, oestrus was indicated by a suspension of cornified cells in the vaginal smear. The next day these appeared in clumps; the animal was killed. The somewhat flattened, therefore slightly degenerated, eggs shown in Fig. 5 were removed from the uteri.

No. 798. Data practically as in preceding. The eggs are shown in Fig. 6.

Further evidence of the rapid transit of the opossum egg from ovary to uterus is furnished by the condition of the fertilized eggs when they first arrive; they are still in the pronuclear stage, whereas in most mammals the egg has attained several divisions and two to three or more days have passed when the eggs reach the uterine horns.

In the opossum fertilization must needs take place in the upper end of the fallopian tube; for as the ovum passes down the tube albumen in great thickness and the shell membrane are added to it and offer impenetrable obstacles for the spermatozoa that may be present in the oviduct.

It is probable that in all mammals fertilization takes place in the upper third of the fallopian tube.[7] It is possible that fertilization *must* take place there if this has not alrealy occurred in the periovarial space. The data on the opossum egg, considered in connection with observations about to be mentioned, argues for a low degree of viability of the mammalian ovum generally. It is possible therefore that the oöcytes of Eutherian mammals are also no longer capable of conjugation with the sperm after a day's sojourn in the tube.

Unfertilized ova of mammals have been little studied. Sobotta[9] briefly discusses the fate of the unfertilized mouse egg. The eggs remain in the oviduct for three days and during this time undergo no fragmentation but show signs of degeneration such, as for example, a concentration of deutoplasm in the center of the ovum. Bischoff[1] finds degenerating ova in the uterus of a non-pregnant sow. The eggs are segmented but are abnormal as indicated by the dull appearance of the nuclei (exactly as in the opossum) in contrast with the clear vesicular nuclei of fertilized eggs in cleavage. Corner and his students,[2 3 4 5] however, have recently studied hundreds of non-pregnant as well as pregnant sow uteri in early stages after ovulation. Corner[4] speaks of finding unsegmented ova along with young small embryos; and in pseudopregnant sows seven days after heat the uterus contains "unsegmented" ova, which are, however, described as very degenerate. The author, not especially interested at the time in the unfertilized eggs, fails to state definitely when the first signs of degeneration appear.

The matter was submitted to the experimental test by Lewis,[8] also working on the sow. This worker bred sows at various times after the oestrous period. He first had to determine the relation of oestrous to ovulation. He found that ovulation in the sow occurs about thirty hours after the first manifestations of heat; and with this Corner and Amsbaugh's[5] findings agree. The egg, therefore, starts down the tube near the end of the oestrous period. Lewis bred each of thirteen sows

out of heat a total of thirty-four times. In seven of these cases services were given on the first day after the period of heat had passed, with positive results in only two cases. Not a single pregnancy resulted from service after the first twenty-four hours after the period of heat had passed.

It seems clear, then, that the egg cannot wait long for the spermatozoa—these must be on hand when ovulation takes place. It seems probable that hours, not days, measure the delay that results in sterile coitus.

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THE VALUE OF CERTAIN GYNECOLOGICAL OPERATIONS

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THE records of Ancon Hospital from 1904 to 1922 inclusive show that 2792 patients have been operated on for gynecological conditions requiring more than simple dilatation and curettement of the uterus. The total number of operations performed was 4881, 810 being extraabdominal and 4071 intraabdominal. It has been possible to study the results of various operative procedures more or less thoroughly through readmissions to the hospital.

Of the total number of 1173 white women, 456 or 38.8 per cent have one or more readmissions to hospital, and of these, 288 or 63.1 per cent were for gynecologic or obstetrical conditions. Of the total number of 1619 black women, 191 or 11.8 per cent have readmissions, and of these, 99 or 51.8 per cent were for gynecologic or obstetrical conditions. It is readily seen that the white woman becomes a much more frequent visitor to the hospital following operation than does the black woman. We believe this is due to the more constricted financial circumstances, more phlegmatic nervous system, and that the

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black woman has received the benefit of more radical surgery especially in the treatment of the pelvic inflammatory diseases.

To facilitate the study, the various operations have been divided more or less loosely into groups, and in order that the results may be presented with reasonable brevity, conclusions must necessarily constitute the greater part of this paper.

Group 1. Operations of Repair

Simple perineorrhaphy has been performed on 288 patients and complete perineal repair with suture of the sphincter ani muscle on 21, a total of 309. Readmissions have followed in 110 instances and show that 23 patients have subsequently been confined, with forceps delivery in one case and with a recurrence of the vaginal relaxation in four patients. During the earlier years covered by this study, the denudation operation of Emmett was used extensively, but since Haynes[1] brought out his modification of the Tait flap-splitting operation in 1908, this latter operation has been used entirely. The operation must not be taken too lightly as shown by the record of three deaths following the Emmett operation from hemorrhage and surgical shock. As used at the present time, allowing at least six months for the tissues to heal and contract, the operation is one of relative safety and the results most gratifying.

It is our opinion that if the vaginal relaxation is such as to cause annoying symptoms, it should be repaired as soon as the tissues will permit operation, and that with careful obstetrical supervision, subsequent labors will cause very little difficulty.

Insufficient numbers of vesicovaginal and rectovaginal fistulae have been seen to draw definite conclusions. However, it would seem that successful closure will follow in at least 75 per cent of uncomplicated fistulae provided proper separation of tissue is done with suture in layers. Rectovaginal fistulae, complicated by ulceration and stricture of the rectum, usually of luetic origin, seen most frequently in negroes, are practically impossible to cure by operation, even following intensive antisyphilitic treatment.

Operations for acquired vaginal atresia are far from satisfactory, and like strictures of other parts, require continued observation and divulsions.

Trachelorrhaphy has been performed on 216 patients, 97 of whom have been readmitted to hospital. Twenty-three have had subsequent confinements, with forceps delivery necessary in three instances, and recurrence of lacerations requiring repair in five cases. Eight patients had subsequent abortions. Postoperative menstrual disorders were noted in eight patients and were entirely confined to white women.

Amputation of the cervix has been used in 72 cases and 27 have been subsequently seen. Seven have been confined, four have aborted, and four have required operation on account of recurrence of the original condition.

From the small number followed it would seem that there is little choice between these two operations as regards subsequent pregnancies and confinements. Menstrual symptoms are more frequent following trachelorrhaphy, while abortions are seen oftener after amputation of cervix. Neither operation should be performed during the child bearing age unless clear cut indications are present that are not amenable to palliative measures.

Group 2. Operations for Displacements

The Dudley plastic operation on the posterior cervical lip has been performed on 21 patients, 10 of whom have been followed. Four have subsequently been confined. Retrodisplacement followed confinement in two instances, while dysmenorrhea and recurring anteflexion were each noted in one case.

From this small group of cases it would seem that this operation has a distinct field in cases of anteflexion associated with sterility and dysmenorrhea.

The retrodisplacements fall into certain more or less distinct classes.

1. Those apparently congenital in origin, nonadherent, and associated with sterility.

2. Those following pregnancy and birth injuries of the vaginal outlet.

3. Those associated with pelvic inflammatory disease and adhesions.

Those of the first class are relieved by suspension alone; the second class require perineal repair with the suspension; while the treatment of the third class frequently becomes that of the pelvic inflammatory condition.

Crossen[2] cites 110 different operations for the relief of these conditions, and it should scarcely be necessary to add that none are entirely satisfactory. The intraabdominal round ligament shortening described by the late John B. Murphy,[3] for which he claimed no originality, but had used for many years, is the operation most often performed in this Clinic for retrodisplacement. It is an anterior-posterior plication of the round ligaments over the fundus of the uterus. It has been used on 1074 patients, of whom 350 have been followed. Forty-six have had subsequent confinements, forceps delivery being necessary in two cases. Eighteen have had abortions. Simple retrodisplacement has recurred in nine, adherent displacement in five, while prolapse has followed in four instances, a total of 5.14 per cent recurrences among the followed cases.

Its advantages are: It is simple, and efficient in a large per cent

of cases. It is safe for the child bearing period. It leaves no bands or pockets for the formation of intestinal twists and herniae.

Its disadvantages are: A certain number of displacements will recur following pregnancy and inflammatory conditions. Care must be used that the tubes are not kinked near their attachment to the uterus. Overestimation sometimes occurs, causing dysmenorrhea of acute anteflexion. There is a slight increase in the liability of abortion.

The Baldy-Webster technic has been used in 31 cases; it seems especially useful in those cases of retrodisplacement accompanied by prolapse of the tubes and ovaries. Its disadvantages are a liability to recurrence due to placing the round ligaments too low on the posterior uterine surface; increase in varices of the broad ligament; and possibility of hernia of intestines through the openings in the broad ligaments as reported by Richardson.[4]

The anterior round ligament plication of Coffey has been used on 12 patients; this operation appears anatomically and physiologically correct and seems especially well adapted for cases of simple retrodisplacement reasonably certain of future child bearing. We have seen no bad results from this operation.

The operative treatment of prolapse of the uterus is dependent on several factors:

1. Extent of the prolapse.
2. Age of the patient.
3. Desirability for future pregnancies.
4. Complications.

With partial prolapse in a woman within the child bearing period desirous of further pregnancies, the operative procedure is a perineal repair and one of the intraabdominal round ligament suspensions. It may be necessary to add an amputation of cervix and plastic work on the anterior vaginal wall in case of elongated cervix and cystocele. This may be called conservative treatment, in no way preventing further child bearing, but with a possibility of recurrence following subsequent confinements. With complete prolapse, and future child bearing eliminated, various intraabdominal fixations and suspensions, supravaginal hysterectomies of various technic, vaginal plastic operations, vaginal ligament operations, the Watkins transposition operation, and vaginal hysterectomies have been used in this Clinic.

In 1919 Freeman[5] devised a method of ventrofixation in which he used a strip of fascia lata passed through the fundus of the uterus and anchored on either side to the fascia of the rectus sheath.

Dr. Earhart, Chief of this Clinic, has modified Freeman's operation by using strips of fascia cut from either side of the low median abdominal incision and left attached at their lower ends. These strips

of fascia are passed through the fundus of the uterus from their respective sides, tied or sutured over the fundus, and their ends anchored to the rectus sheath. The advantage of this operation over that of Freeman is at once apparent.

Sterilization by resection and burying the ends of tubes in the broad ligament should be done with all fixation operations where there is a remote possibility of future pregnancy. The treatment of prolapse complicated by fibroids, pelvic inflammatory disease, or ovarian tumors becomes that of the complication in many instances.

Group 3. Operations for Uterine Fibroids

The operative treatment of uterine fibroids is myomectomy or some form of hysterectomy. Myomectomy has been performed on 52 whites and 47 blacks, of these, 15 whites and 7 blacks have been readmitted. Pregnancy has followed in two cases; fibroids have recurred in three instances. The following types of hysterectomy have been performed and followed:

Supravaginal, simple	6 White	37 Black	2 W	4 B
" with complete removal of adnexa	36 "	213 "	0	1
" one ovary remaining in situ	18 "	29 "	1	0
" both ovaries remaining	3 "	10 "	0	1
" unilateral adnexa remaining	2 "	5 "	0	0
Panhysterectomy, adnexa removed	2 "	8 "	0	1

Endocervicitis, 1; ovarian cyst, 1; neurasthenia, 1; and malignant disease of the ovary, 1, were noted among the followed cases.

Myomectomy is indicated in cases of uncomplicated pedunculated fibroids at any age. In young women desirous of future pregnancies, with small multiple fibroids, easily accessible, uncomplicated by pelvic inflammatory disease, myomectomy is the operation of choice.

A large per cent of fibroids are complicated by chronic pelvic inflammatory disease, especially in negroes. Supravaginal hysterectomy with complete removal of adnexa is indicated in these cases.

It is wise to leave the adnexa *in situ* in women under 35 years, provided they show no evidence of adnexal disease. Tubes and ovaries should be left unmolested if possible. Removal of tubes is liable to interfere with ovarian blood supply, later causing cysts of ovaries left *in situ*. The practice of leaving a single ovary or a portion of an ovary is probably of little or no benefit.

Group 4. Operations for Pelvic Inflammation

This group contains a total number of 1165 cases of various pelvic inflammations, with the operative findings showing the ovaries uninvolved in 397 or 34 per cent. Operative procedures fall into three classes; those classified as radical where both functions of menstruation and reproduction are lost. The various hysterectomies fall in this class, as does a small sub-division, those cases where bilateral

salpingo-oöphorectomy has been done with the uterus remaining *in situ*. This latter procedure is unsurgical and not to be recommended. The second class may be called conservative where both menstruation and reproduction may be retained. In this class the parts removed are removed entirely as in unilateral salpingectomy or salpingo-oophorectomy. The third class may be styled the ultra-conservative, the gynecologic patch work, or trying to make something out of nothing, and includes the partial resections of tubes and ovaries, stomatoplastic operations, etc.

A total of 585 operations of the first class were done; 66 patients were followed and 7 were readmitted for gynecologic conditions, or 1.2 per cent of the total cases. Causes for readmission were neurasthenia in one, recurring ovarian cyst in two, bladder symptoms in one, wound hematoma and infection in one each, and ventral hernia in one.

Two hundred ninety-four operations of the second class were performed; 67 of these were followed and 34 were readmitted for gynecologic conditions. Three were admitted for confinement and three for abortions. Recurrence of the inflammatory condition was noted in 9.5 per cent.

Three hundred ten operations of the third class were performed, including 87 cases of posterior vaginal puncture with drainage. Ninety patients were followed, 83 being readmitted for gynecologic conditions. Six of these were for confinement and one for abortion. Recurrence occurred in 24.5 per cent of these cases. Pregnancy followed posterior vaginal puncture with drainage in four, resection of tubal cyst in one, and unilateral stomatoplasty in one. The abortion followed resection of tubal cyst.

From our study of the pelvic inflammatory group we draw these conclusions:

1. Local operations, as removal of unilateral adnexa, should only be performed when disease conditions are sharply localized.

2. The patch work gynecology is usually time wasted and pregnancy follows so rarely that these operations should only be used in exceptional cases.

3. Vaginal puncture and drainage for pelvic abscess will relieve symptoms and prevent recurrence in slightly more than half the cases. It is a useful operation in acute suppurative pelvic disease and pregnancy will occasionally follow in these cases.

4. With both tubes and ovaries involved in suppurative disease, or diffuse pelvic inflammation with adhesions or cystic formation, supravaginal hysterectomy with complete removal of adnexa is the best operative treatment regardless of age.

5. Ruptured pyosalpinx occurs in about 1 per cent of pelvic inflammatory cases and with immediate operation and drainage the mortality should not exceed 10 per cent.

6. Drainage through the culdesac of Douglas is indicated in all cases where pus has been spilled in the pelvis. Abdominal drainage is used only when it is impossible to drain through the culdesac. Large quarantine packs and Mikuliez's drains through the abdomen are unnecessary and frequently followed by hernia.

Group 5. Operations for Ectopic Pregnancy

A paper on "Extrauterine Pregnancy" consisting of a review of 101 ectopic pregnancies in Ancon Hospital from 1905 to 1921 inclusive was presented to this Society in 1922. Our total of ectopics has now reached 117. During the past year two cases of this group were of unusual interest.

1. A woman who had had both tubes and one ovary removed at another hospital, was operated on here twenty months later and an ovarian pregnancy removed.

2. A woman operated on for ruptured tubal pregnancy of the right side, showed an unruptured ectopic of the left tube, apparently of different age.

Group 6. Operations for Benign Tumors of the Ovaries

Tumors are classified as follows:

1. Small cystic degeneration.
2. Unilocular cysts.
3. Multilocular cysts.
4. Dermoids.

Twenty-four and one-half per cent of all cases showed bilateral involvement, and about 30 per cent were so intimately associated with pelvic inflammatory disease that the treatment became that of the complicating condition.

With ovarian disease uncomplicated by inflammatory conditions, it has been the policy to save as much as possible by conservative operation. If it becomes necessary to sacrifice both ovaries, a supravaginal hysterectomy is the operation of choice. Eight hundred twenty-seven patients have had conservative operations on the ovaries. Of these, 226 followed cases showed recurrence of cystic disease in 16 or 7 per cent. Nine of these recurrences occurred in cases complicated by chronic pelvic inflammatory disease.

Group 7. Operations for Malignant Disease of the Female Genital Organs

The findings of this group are most disheartening. Operations have been palliative, as excisions and cauterizations, and radical, with complete removal of pelvic organs. Of 41 cases, 11 have been followed, and one five year cure is the result.

The operability is extremely low, especially among the blacks and

it is rare one comes for examination before the vault of the vagina is filled with carcinoma.

Authentic cures by radium are yet rare; there seems to be no question that hemorrhage and sloughing are much lessened and life prolonged and made more comfortable by its use.

Group 8. Cesarean Section

The records show six vaginal, 52 abdominal, and one Porro operation. Thirty-four cases of eclampsia have been treated by cesarean with a mortality of 29.4 per cent. Of 17 cases followed, eight have had subsequent confinements, two by cesarean, three by forceps, and three with normal labor.

Group 9. Operations for Miscellaneous Conditions

Tuberculous disease of the pelvic organs has been noted as follows: Tubes alone, 5; Ovary alone, 1; Tubes and ovaries, 5; Endometrium, 2.

Radical pelvic surgery is indicated for this condition; the leaving of an ovary or portion of an ovary is likely to result in cystic degeneration with adhesions. The prognosis in these cases is good provided the source of infection can be eradicated.

Appendectomy has been performed in 762 cases in this series, 508 of whom were whites and 254 blacks. Pathologic reports show chronic appendicitis in 218 whites and 85 blacks, and acute appendicitis of various types in 42 whites and 39 blacks. Tuberculous appendicitis was noted on one occasion in a black.

Cholecystostomy has been performed on 17 and cholecystectomy on 5 cases.

Various other intestinal operations associated with the pelvic operations were: Colostomy or enterostomy, 3; Closure of fecal fistula, 1; Resection of rectum, 3; End to end intestinal anastomosis, 5; and Diverticulectomy, 2.

One of the most discussed subjects in gynecologic surgery is the choice of type of hysterectomy and the resulting artificial menopause.

Regarding vaginal hysterectomy, Graves[6] says, "As compared with a properly executed abdominal hysterectomy, the extirpation of the uterus per vaginum has no advantage. It cannot be done more rapidly, and there is no less shock or loss of blood, though claims to the contrary are sometimes made. Vaginal hysterectomy is useful in some types of operation for procedentia."

Crossen[7] reserves vaginal hysterectomy for certain types of prolapse with small fundus, and cases of small fibroids uncomplicated by inflammatory disease where it is possible to deliver the uterus through the vaginal incision.

Hirst and Mazer,[8] writing on prolapse of the uterus, state that "it is a grave mistake to perform either abdominal or vaginal hysterec-

tomy as a cure for prolapse, unless the uterus is so diseased as to make its removal imperative for that reason. The uterus is the best possible support to retain the protruding cystocele, and no other structure, whether broad ligaments or vaginal fascia, will satisfactorily take its place."

There are those who advocate the use of panhysterectomy in preference to the supravaginal variety and cite as arguments the recurrence of chronic endocervicitis in the stump, the recurrence of cervical fibroids, and the later occurrence of carcinoma of the cervix. In a total of 816 patients having supravaginal hysterectomy, 91 have been followed. Two patients have returned for persistent endocervicitis, cancer has developed in the cervical stump in one instance, while there is no record of recurrence of cervical fibroid.

Taking into consideration the greater ease in performing supravaginal hysterectomy, the better pelvic support it affords, and the lower mortality, it is apparent that panhysterectomy should be reserved for those cases of pelvic malignancy where radical operation offers a chance of cure, for those borderline cases with diseased cervix that are likely to become carcinomatous, for pelvic tuberculosis with involvement of the endometrium, and for certain cases of fibroids involving the cervix.

Forty-one white and four black women have been readmitted to hospital with severe nervous symptoms subsequent to the following operations:

Hysterectomy, supravaginal, complete removal of adnexa	3
Hysterectomy, supravaginal, with one ovary retained	7
Conservative operations of the ovaries	11
Conservative operations of the tubes	7
Operations for displacements	8
Operations of repair	9

Close scrutiny of the records show most of those with postoperative neurotic symptoms to have had a decidedly nervous temperament preceding the operation. We admit that operation often aggravates these symptoms and that great care should be exercised in advising operation for this class of cases. We believe that castration in the adult woman has been overestimated as the cause of these nervous conditions, and our records tend to show that incomplete, conservative surgery is a much more frequent cause.

We have had no readmissions for atrophy of the external genitals following castration, and believe this condition, severe enough to cause distressing symptoms, to be rare.

Operative accidents were noted as follows:

Sponge or gauze in the abdomen	4
Wound of bladder	5
Wound of rectum	4
Wound of intestines	2
Wound of ureters	5

Postoperative complications were seen as follows:

Pelvic abscess	16	5.6 per 1000
General peritonitis	10	3.6 " "
Fecal fistula	11	3.9 " "
Wound infection	85	3%
Hemorrhage	9	3.2 per 1000
Spontaneous rupture abdominal wound	11	3.9 " "
Phlebitis	9	3.2 " "
Pneumonia	4	1.5 " "
Acute gastric dilatation	5	1.8 " "
Surgical shock	8	2.8 " "
Embolism	2	0.7 " "
Acute intestinal obstruction	3	1 " "

DEATHS

The mortality rate of the entire series was 2.5%, 1.8% for whites and 3.1% for blacks.

CAUSE OF DEATHS BY GROUPS	1	2	3	4	5	6	7	8	9
Hemorrhage	2		1						1
Surgical shock	1			4					
Peritonitis, general		2	1	10	2			3	2
Acute intestinal obstruction		1							
Cerebral thrombosis		1							
Pulmonary tuberculosis		1							
Severe secondary anaemia			1						
Embolism			1	1					
Acute gastric dilatation			1						
Anuria			1			1			
Pneumonia			2						
Anaesthesia			1						
Rupture abdminal wound			1	2	1			1	
Hemophilia				1					
Septicaemia				2					
Pyaemia				3					
Pyosalpinx and fibroids				2					
Acute nephritis				1					
Syphilis				1					
Ruptured tubal pregnancy					2				
Ischio-rectal abscess						1			
Carcinoma cervix uteri							3		
Carcinoma ovary							1		
Eclampsia								7	
General tuberculosis									1
Total cases	240	683	316	1052	117	208	41	58	39
Total deaths	3	5	10	27	5	2	4	11	4
Total per cent deaths	1.25	.73	3.16	2.46	4.27	.96	9.75	18.96	10.8
Corrected per cent deaths*	1.25	.58	3.16	2.29	4.27	.48	9.75	7.84	7.89

*2—Pulmonary tuberculosis; 4—Acute nephritis; Syphilis; 6—Ischio-rectal abscess; 8—Eclampsia, 7; 9—General tuberculosis; Total corrected per cent of deaths, 2.11.

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THE OCCIPUT POSTERIOR*

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CHOICE of the above subject is inspired by the conviction that from the standpoints of frequency of occurrence, difficulties encountered and responsibilities involved there is no condition more important than the occiput posterior. For this reason it has been chosen for presentation before the Section.

In what follows attempt will be made to establish the occiput posterior as a problem that is broad in that irregularities of uterine action and limitations of bony pelvis commonly enter and one that can be attacked more satisfactorily along the lines of active expectancy than along those of interference by the employment of empirical methods for the symptomatic cure of obstructed or unnecessarily prolonged labor.

It must be understood that the term occiput posterior is applied to cases in which the occiput is directed toward the rear as the presenting-part descends. Since descent occurs in late pregnancy or in early labor, the cases considered are those in which labor begins with the occiput directed posteriorly rather than anteriorly. They are cases in which the occiput posterior is a primary position. Included in this classification are two groups of cases. First, those in which the occiput, though primarily posterior, subsequently rotates anteriorly and is born; and, second, those in which either no attempt at anterior rotation is made and posterior position of the occiput "persists" or those in which anterior rotation, even though begun, is incompletely carried out.

There are two reasons for the general impression that the posterior is of infrequent occurrence. In the first place, statistics show that the occiput is "found to the front" in from 70 to 90 per cent of cases. This is true; for the majority of posteriors rotate anteriorly, and examinations made after rotation has well begun reveal the occiput in anterior position. Therefore, statistics based upon examinations made at indifferent times during labor, and particularly if late, are valueless in determining frequency with which the occiput, at the onset of labor, is directed posteriorly. Further, those based upon observations as to which direction and to what extent restitution takes place are not only valueless but often lead to the erroneous conclusion that the occiput was primarily to the front because restitution takes place through an arc of but 45°. Unless the shoulders are engaged at the

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time of anterior rotation, they rotate as does the occiput, and restitution that follows is that characteristic of a primarily anterior position. It is only in the occasional case where shoulders are engaged at the time of anterior rotation that restitution, for reasons that are apparent, takes place through an arc of 135°.

Since each primary posterior is potentially a persistent posterior, statistics are of value and clinical course of the individual case can be followed intelligently only as they are based upon careful examinations made at the onset of or, at least, early in labor. Care with which examinations are to be made must be emphasized because association of deflexion sufficient to bring the chest wall forward and to make it possible for the fetal heart to be heard anteriorly is so characteristic of the posterior that the case is often incorrectly recorded as an anterior if diagnosis is based upon nothing more than the fact that heart is heard distinctly toward the front.

In the second place, the term posterior is applied by some authorities only to those cases in which posterior position persists. But so many primary posteriors undergo spontaneous anterior rotation that instances of persistence of the posterior position are relatively infrequent. Call only the latter "occiput posteriors" and a false impression of the actual frequency with which the occiput lies primarily to the rear is created. Literally the term "posterior" should be applied to the larger number of cases in which the occiput is directed posteriorly in the first place. "Persistent occiput posterior" then is reserved for a complication in the clinical course of the posterior. The term is descriptive of this complication and should be applied to it.

At this point it is insisted that primary position of the occiput is posterior in approximately 50 per cent of all cases, and it is believed careful observation will establish the truth of this contention to one's entire satisfaction. For reasons that will appear, R.O.A. is far more common than L.O.P.

L.O.A. may be termed the natural position. Long diameter of the head lies in the more available right oblique diameter of the inlet and the occiput is directed anteriorly because the convex back fits the concave anterior uterine wall. Further, it is "natural" for little anterior rotation is required of the occiput as it advances. But the head can lie as readily in the diameter mentioned with occiput to the rear as to the front; and such position will be assumed if a force tending to direct back of the child toward the maternal right flank were to be brought to bear upon it. Were the patient to lie on her right side, the child's back would be so directed because "ballottement" proves the child to be heavier than the fluid in which it is immersed. Were shoulders unengaged, occiput would follow back and the head would lie with its occiput directed posteriorly. Further, were

position of the head maintained as the mother resumed the upright position and were engagement to occur subsequently, a primary R.O.P. would be met at the onset of labor. On the other hand, were engagement not to occur, back and occiput might be redirected to the front, but the convex back merely accommodates itself to the anterior concavity of the uterus. There is no force holding it there; while, with the patient on her side, gravity actually displaces the child's body posteriorly unless previous engagement of shoulders holds its upper part (and the head) toward the front. The left-lateral posture can as readily become an important factor in assumption of the L.O.P. position.

Tendency of the back to gravitate toward the maternal right or left flank as the patient lies on one side or the other is emphasized for two reasons. First, it offers at least an explanation of frequency of the R.O.P. position, for the right-lateral is the posture that, late in pregnancy, is so commonly assumed by the mother. Few patients can sleep in the dorsal posture and increased respiratory embarrassment occasioned by the growing uterus makes the left-lateral posture far less comfortable, therefore less often unconsciously assumed, than the opposite. Second, it illustrates the wisdom of having the patient lie on the "opposite" side in attempt at correction of a posterior. Obviously, postural treatment of the kind is suited only to cases in which the presenting-part is either unengaged or simply resting in the pelvic inlet.

It is not claimed that posture in which the mother spends from six to eight hours out of every twenty-four determines position of the occiput. Were this the case there would be few L.O.A's for reasons that are apparent. Maternal posture is offered simply as a factor in assumption of the R.O.P. position. However, it is thought to explain more cases than the familiar "pendulous abdomen," "multiple pregnancy," "hydramnios" and the like that are inadequate as etiological factors in that they fail to account for a sufficiently large number of posteriors that are met. R.O.P. is of frequent occurrence; there must be clinical factors or forces that bring it about: and maternal posture is thought to be an important one.

It is possible to interpret correctly the clinical course of labor where the occiput is posterior and to attach proper significance to fairly constant physical signs only as certain fundamentals of mechanism of the posterior are understood. For this reason, mechanism, physical signs, and variations from the purely physiological that the posterior invites will be considered together.

The most striking physical characteristic of the child when the position is posterior is varying degree of deflexion, or bending backward, of the presenting-part. Postpartum evidence of this is invariably offered by presence of the caput well forward of the occiput,

the distance being an accurate measure of the amount of deflexion. Further, deflexion is known to be produced at the inlet when there is disproportion between its antero-posterior size and that of the presenting-part; and it invariably results when the head reaches the ample mid-pelvis. Deflexion has double significance. First, as a result of it, the attitude of universal flexion is departed from. Chin leaves the chest and the latter is directed forward and, therefore, toward the uterine wall making it possible for the foetal heart to be heard loudly over the anterior chest wall as well as through the back. Second, eccentricity of the advancing pole progressively diminishes as deflexion is increased until, with the head in mid-position (that is, neither flexed nor extended), it is concentric. Since anterior rotation requires at least some degree of eccentricity of the advancing pole, the movement is less perfectly carried out as the head is less completely flexed, even though contractions are efficient and the pelvic floor capable of exercising its anteriorly-directing force.

Further, to simplify discussion, the presenting-part will be considered as assuming one after another of four arbitrary positions along the birth canal as follows: (1) above the inlet, (2) in the pelvic inlet, (3) in the mid-pelvis, and (4) at the pelvic outlet.

(1) With the presenting-part above the inlet, engagement has yet to occur; and, therefore, though back and occiput are directed toward one of the four quadrants of the inlet or lie transversely, an actual "position" has not yet been assumed. However, probable position can be determined with at least a fair degree of certainty, although frequency with which apparent position changes before engagement occurs is a matter of common experience.

(2) With the head in the inlet, position becomes permanent regardless of whether engagement occurs in an oblique or in the transverse diameter. However, engagement in the latter diameter has an important bearing upon subsequent behavior of the presenting-part should the occiput be re-directed posteriorly as it reaches the ample mid-pelvis. The transverse is appropriated when antero-posterior shortening makes the obliques less available and such shortening occurs in simple flattening, a slight degree of which is the commonest pelvic abnormality met. This flattening is ordinarily of little clinical importance in primiparae because its degree is trifling and engagement as a rule occurs early when the head is not full-grown. But in late engagement characteristic of multiparity, the broad bi-parietal diameter of the full-term head is momentarily retarded by resistance the relatively or actually flattened inlet occasions, the fore part of the head advances, and a varying degree of deflexion results as the head passes the inlet. If slight, the presenting-part is said to be deflexed; if extreme, the face may even be made to engage and advance. How-

ever, deflexion characteristic of the posterior is alone to be considered at this point.

Continuation of forces that have deflexed the head causes it to advance and, at the same time, begins moulding and caput-production. The latter processes are of great clinical importance. As a result of them, the presenting-part is elongated in an attempt at adaptation of shape of head to that of the pelvic cavity. When sufficiently elongated, spontaneous correction of deflexion by the action of physiological forces is not to be expected, and even manual flexion of the head, though momentarily successful, is followed by resumption of the original deflexion when the artificial force is removed. It follows that the time to flex the head near the inlet is just as the latter's bony resistance is passed and before, or very soon after, moulding and caput-formation have begun.

Early physical signs may well be considered at this point. The dependable ones are elicited as a result of abdominal palpation and auscultation. It is only late in labor that increasing dilatation makes it possible to elicit with ease signs referable to the occiput itself. While there are several early signs that are of diagnostic value, there are two that are most dependable. They are, first, the presence of small, firm, rounded and movable masses indicating location of the feet and, second, the location in which the foetal heart is heard with maximum intensity.

Bearing in mind that, with the child in the attitude of universal flexion, feet and back are at opposite ends of the antero-posterior diameter of the foetal ovoid and that occiput and back are in line one with the other, it is apparent why presence of freely movable small parts above and just to the left of the umbilicus is one of the most dependable signs upon which the diagnosis of R.O.P. can be made. Here one should be able to locate the firm, rounded resistance the back offers in the right flank, but the placenta may give like signs. On the other hand, the feet cannot only be palpated but they can often be seen to move.

Heart sounds are heard with maximum intensity in the flank even in the presence of deflexion sufficient to bring the chest so far forward that heart beat can be heard on the opposite side toward the front. Because of frequency of posterior positions, diagnosis of occiput-to-the front may not be made on location of strong heart sounds anteriorly. Rather, search for presence of sounds equally as prominent in the opposite flank, palpation of the presenting-part as it lies in the inlet for evidence of deflexion that explains the auscultatory findings, and determination of locations of feet and back if possible are essentials of diagnosis that may not be omitted. Were these simple precautions observed in every case, few posteriors would be missed and management of those met would be more satisfactory.

(3) With the presenting-part in the mid-pelvis, deflexion is invariably present. It is relative or absolute; it may be both. Size of plane of the advancing head is increased and its effect upon the clinical course of labor is unfavorable.

The amount of actual deflexion that results depends upon the manner in which the presenting-part passes the inlet. If well flexed because of uniform resistance encountered, associated moulding and beginning caput-formation can be counted upon to preserve the physiological attitude. The head is too elongated to unbend and it presents a well-developed and eccentric advancing pole. Each contributes toward spontaneous or relatively simple instrumental anterior rotation that is characteristic of cases of the kind.

However, if deflexion has occurred at the inlet, moulding is correspondingly less pronounced and the more or less rounded head eventually reaches the mid-pelvis the ample size of which invites deflexion. Cases of the kind are common in multiparity where, for reasons that will appear, little or no attempt at spontaneous anterior rotation may be made. The ease with which even large, unmoulded heads can be rotated manually in the mid-pelvis, provided they are sufficiently deflexed, is evidence of the ample space afforded for deflexion.

Relative deflexion on the other hand has to do only with relation between long diameter of the head and general direction of the birth-canal in which it rests. Because long axis even of a well-flexed head in posterior position is directed toward the rear while that of the birth-canal runs forward as its lower portions are reached, the advancing pole of the presenting-part is back of center of the anatomical birth-canal and forward of the occiput. For the latter reasons, the head is relatively deflexed.

Though position of the head as described has some bearing on the clinical course of labor, its especial importance is due to the fact that it occasions the following common and significant physical sign: in posterior positions, with the head in the mid-pelvis, the cervix is further back and the anterior lower segment is more elongated than in anterior positions. This is to be interpreted as Nature's attempt at accommodation of direction of birth canal to that of the presenting-part by posterior displacement of the cervix.

However, anatomical limitations to this accommodation make it impossible for the cervix to be displaced as far posteriorly as the mid-point on the advancing vertex and account for the fact that the caput, even on heads that are absolutely flexed, is almost invariably located well forward of the occiput. Relative deflexion resulting explains subsequent difficulties in anterior rotation that many well-flexed heads meet.

At this time the cervix is usually undergoing dilatation sufficient

for the introduction of one or two fingers. However, orientation of the presenting-part is often difficult when fontanelles and sutures are depended upon as guides; for, if caput-formation is at all well advanced, structures over the cervix are made out with difficulty if at all, and the "diagnostic" anterior fontanelle is beyond reach of the examining finger if the head is well flexed and the cervix only moderately dilated. Until the occiput can actually be felt, vaginal signs are often no more than probable and should be controlled by abdominal signs referable to position of the child's body.

(4) As the presenting-part reaches the pelvic outlet, clinical importance of the posterior is greatly increased. Aside from the fact that constant, general backache is a frequent complaint, labor up to this time may have been uneventful. Though premature rupture of membranes is more frequent than in anterior position, they commonly remain intact if the presenting-part has engaged and descended well flexed.

It is near the pelvic outlet that two of the most important steps in the mechanism of labor are gone through with. They are, first, complete dilatation of the cervix and, second, anterior rotation of the occiput. That anterior rotation may occur, it is necessary that forces capable of producing it be brought to bear upon the occiput and that they exceed any forces that might interfere with such rotation. As the two approach each other, rotation is slow or incomplete. As the latter exceed the former, rotation fails completely and the posterior position persists.

The following physical conditions and forces favor anterior rotation. It is only as full dilatation is accomplished that the presenting-part can come in contact with the pelvic floor. The structure can rotate neither the lower segment nor the presenting-part while within the uterus. Therefore, until the head passes the cervix, little if any rotation is to be expected of it. These principles are of great importance; they emphasize the advisability of directing attention first to incomplete dilatation rather than to failure in rotation when the two are found associated and treatment is called for.

The well-flexed head presents the following characteristics that facilitate rotation: its advancing pole, the occiput, is at maximum distance from the anatomical center of the head and, therefore, is eccentric; its broad bi-parietal diameter is located at a low, that is, an advanced, level; and the plane presented by it is roughly spherical. A head with an eccentric, advancing pole turns (or rotates) more easily than one that possesses such a pole near its center for the same, apparent reason that a wheel is made to revolve with less effort as force is applied to its rim rather than to its hub. Further, each half of the pelvic floor directs a body meeting it downward, forward and inward. Were a body to meet both sides at the same time, direct-

ing forces would be nullified and the body would remain stationary. With the advancing pole "off the center" as is physiological, but one half of the pelvic floor is met, characteristic direction is imparted to it, and anterior rotation results. The pelvic outlet is not uniformly oval. Its size is diminished posteriorly by the inwardly-projecting ischial spines that readily interfere with rotation were it to occur at level of the outlet. But with the head well-flexed, its broad bi-parietal diameter is on a level below that of the spines and anterior rotation is normally not interfered with because of them. Again, presence of flexion is evidence of an attempt at accommodation, this time, of size of the presenting part to size of the pelvic outlet.

Finally, physiological pelvic floor and well-maintained flexion are not active forces. They produce rotation only as advance is imparted to the head by the contracting uterine muscle.

Forces and conditions that interfere with anterior rotation are due to abnormal action of uterine muscle, to deflexion, and to lack of normal pelvic-floor tone.

Abnormal action of uterine muscle is considered first because complete dilatation of the cervix is a necessary preliminary to anterior rotation. The cervix dilates when none but physiological forces are brought to bear upon it. With membranes intact and with contractions manifesting satisfactory intermittency, cervix and lower segment are drawn upward over the more or less rounded, well-flexed head. But let inertia develop as a result of increased effort necessary for moulding and descent, or let upward advance of the lower segment be retarded because of premature rupture of membranes with inevitable application of uterine walls to the irregularities of the presenting-part and tendency toward retraction of the lower segment, and progressive dilatation ceases before it is complete. Like results attend setting up of Bandl's ring in tonic contraction. Here the occiput remains in posterior position simply because it has not yet been given an opportunity to rotate anteriorly. Were inertia to develop after dilatation, rotation would not occur because of failure of the active force that directs the occiput forward.

Failure in rotation due to deflexion results from the presence of an advancing pole located toward the center of the head and, therefore, directed with less force downward and inward by the pelvic floor. If deflexion were slight, certainly if it were no more than "relative," rotation would doubtless begin; but, accompanying it, there is often increased descent as contractions persist and rotation ceases with the presenting-part deep in the pelvic cavity in the position known as "deep transverse arrest." Two other factors are to be considered in connection with deflexion. They are, first, increased size of transverse plane of the presenting-part that becomes less spherical and more elliptical as deflexion increases and, second, as-

sumption of a higher level by the broad bi-parietal diameter as the forepart of the head descends in deflexion. The larger plane meets increased resistance in rotation as might be expected. The situation is still further complicated by the fact that this broad diameter must rotate on a level approximating that of the ischial spines. Were the latter but little over-prominent, slight success would attend efforts of uterine and pelvic-floor muscles to direct the occiput forward. Many cases of persistent posterior in multiparae are explained on this basis.

Failure in rotation due to lack of tone characteristic of the normal pelvic floor is rarely met in primiparae. Relaxed floor is common in multiparae. It may be the result of unrepaired lacerations that the relaxed vaginal outlet gives evidence of. Again, it is noted where no apparent laceration has occurred but where muscles have been stretched by long-continued pressure of a large head in the lower mid-pelvis, or where multiple sub-mucous lacerations of its fibers result in permanent loss of tone it should possess. Finally, it results too often from failure to appreciate that laceration is rarely limited to the perineum but commonly extends a greater or less distance upward into one or both vaginal sulci, and from the too-frequent practice of applying sutures to outward laceration only, leaving the inside unrepaired and, therefore, permanently relaxed.

Regardless of extent to which the pelvic floor is relaxed, some degree of anterior rotation can be expected of it, although the clinical course of labor is often influenced by it in one of the following ways: First, as a result of its ability to impart some forward motion to the presenting-part, the occiput begins anterior rotation; but the process is complicated by a varying degree of deflexion that results in production of an advancing plane of larger diameters, and anterior rotation soon ceases because of pelvic-floor, muscular insufficiency together with increased bony resistance encountered. The presenting-part rests in the transverse diameter of the outlet and, because of relaxation, at a level that is deep. If sufficiently low, the caput appears at the outlet. In fact, in posterior positions, appearance of the caput and subsequent failure of the presenting-part to advance in the presence of efficient, propulsive contractions is presumptive evidence of "deep transverse arrest." Since stretched and relaxed muscles explain incomplete rotation and make possible deep position of the presenting-part, failure of the relaxed pelvic floor as a rotating force must be an important factor in production of "deep transverse arrest."

Second, association of relaxation and deflexion results frequently in complete failure in anterior rotation, and position of the occiput, directed posteriorly and to the right or the left, "persists." If expulsive efforts continue, the presenting-part advances a sufficient dis-

tance for the perineum to be distended. When the perineum bulges posteriorly, evidence is positive that the head is advancing with the occiput directed posteriorly.

Third, when anterior rotation is impossible because of condition of the pelvic floor described, nature frequently brings about spontaneous delivery by substituting for anterior rotation a movement that accomplishes the same purpose, namely, accommodation of antero-posterior diameter of head to the same diameter of the pelvic outlet. The occiput rotates posteriorly the short distance necessary for it to lie in the hollow of the sacrum, and the position becomes "occipito-sacral."

Slight disadvantage that arises from the fact that larger rather than smaller diameters pass the outlet as the head is delivered occiput-directly-to-the-rear is more than compensated for by the fact that both mother and child are spared the possible dangers of obstructed labor, due to deep transverse arrest or persistent posterior that might continue unrecognized, when delivery is accomplished in this manner. Further, the question of increased soft-part resistance is of relatively slight importance because the occipito-sacral mechanism is almost invariably met in multiparae where the outlet is more or less large or in primiparae where the child is relatively or absolutely small.

Physical signs of the posterior at the pelvic outlet are easily elicited because the cervix presents relatively advanced dilatation. The caput lies in the cervix. While its size is roughly determined by cervical dilatation, its thickness is an unfailing measure of efficiency of uterine contractile efforts. Efficiency rather than strength is emphasized; because, in the presence of retraction or tonic contraction ring, the lower segment is drawn upward over the presenting-part with increasing difficulty, the cervix fails to dilate progressively, and the caput ceases to increase in thickness. Grasp of the retracted lower segment makes contractions inefficient as dilating forces regardless of their strength.

Location of the caput is an unfailing guide as to the amount of deflexion present. When the head is well flexed, it is located at the anterior border of the occipital bone. Its position is forward of the occiput as deflexion obtains. Palpation of diagnostic fontanelles and sutures is often difficult when a large caput overlies them; and the occiput can be located with accuracy only as the examining fingers are carried far enough in to palpate it or to feel the anterior fontanelle. In doubtful cases, exploration of the lower segment in an effort to locate the posterior ear is justified. At such time, region of the contraction ring can be examined for evidence of tone that may offer ready explanation of failure in dilatation and anterior rotation.

As the head is born, the occiput is seen to turn back through an arc

of 135° when the primary position was posterior and the shoulders were engaged when anterior rotation occurred. When the head restitutes through an arc of but 45°, the only constant signs of early posterior position are those referable to the caput.

As a result of its examination, three points of clinical importance can be established: First, presence of the caput forward of the occiput is evidence of deflexion characteristic of all posteriors and can be taken as the measure of it in the individual case. Second, its location at one side or the other of the sagittal suture shows primary location of the occiput to have been toward the opposite side. Third, thickness or depth of caput can be accepted as positive proof of the amount of muscular efficiency actually expended in driving the presenting-part onward.

Treatment of the occiput posterior resolves itself into an appreciation of defects in physiological mechanism that result in failure in rotation and advance and the carrying out of procedures that correct or compensate for these defects. What you do depends upon what Nature has not done or is doing improperly, and is guided by well-defined principles. It follows that there can be no arbitrary method of treating the posterior.

Further, treatment is both preventive and active. It consists of prophylactic management of pathological conditions that make progressive advance difficult or impossible, and of active treatment of the manifestations of unsuccessful rotation and retarded advance. If this attitude toward the posterior is acquired, it will be unnecessary to learn what to do; on the contrary, procedures suggest themselves.

With the presenting-part unengaged, treatment is prophylactic. When the child's back is found in the maternal right flank and the right-lateral is the posture commonly assumed while at rest, the patient may well be directed to lie on the left side, when the child's body will be directed toward the front. This favors engagement with the occiput in anterior position; and it could well be supplemented by having her wear properly adjusted pads inside her corset to hold the back forward as the patient assumes the upright posture. Position changes so often before engagement and the prognosis for successful anterior rotation in the posterior is so good that these procedures have possibly more theoretical than practical value. However, in the presence of prominent ischial spines, relaxed pelvic outlet, or of uterine muscle of which diminished action is to be expected, their practical value increases.

If engagement fails to occur, it is because of actual or relative pelvic contraction or primary uterine inertia; and treatment indicated is that the type of abnormality calls for. It is immaterial whether or not position is a probable posterior.

With the presenting part well engaged, active treatment is rarely

called for. In a primipara the head is usually engaged in an oblique diameter and satisfactory flexion can be expected. In a multipara engagement in the transverse is usual and the position becomes an actual posterior only as the occiput rotates toward the rear as anatomical relations between head and back, located in the flank, are restored. At this point the possibility of converting a probable posterior into an anterior by placing the patient on the opposite side to that toward which the occiput is directed should be borne in mind. Such treatment will result in enough anterior displacement of the back to assure descent with the occiput toward the front in a sufficiently large number of cases to warrant its general employment. All that is required is that the probable position, based upon knowledge of location of the child's back, be known and that the patient be in bed. Conservation of general muscular strength that results and opportunities offered for frequent palpation of contractions are sufficient reasons for keeping her there.

A "defect in physiological mechanism" occurring at the inlet is premature rupture of membranes. Its clinical significance depends almost entirely upon dilatation present when the accident happens. If the internal os is quite completely obliterated, the course of labor is more often expedited than retarded. On the other hand, when internal os is discrete and lower segment thick, dilatation proceeds slowly. Should lower segment retraction develop, not only upward advance of the lower uterus over the presenting-part but also downward progress of the latter through it, would be retarded. If retraction were sufficiently prominent, labor would become obstructed.

In the latter condition danger is increased when the position is posterior and deflexion exists because increased size of the presenting-part offers still greater resistance to progressive dilatation and lower-segment thinning-out. Treatment, when decided upon, should be directed toward relief of retraction and accomplishing dilatation rather than toward securing anterior position for the presenting-part.

With the head engaged, the occiput can be brought forward only as the head is raised above the inlet. If disengaged from the transverse diameter, re-engagement in the same diameter can be expected. If raised out of an oblique, the manipulation necessary to bring the occiput anteriorly invites the danger of prolapse of cord and, for this reason, is of questionable value. Provided the fact that the cervix dilates less readily over a deflexed head is borne in mind, position of the occiput can be disregarded in treating the conditions mentioned. Here, conservative manual dilatation under an anesthetic and introduction of a hydrostatic dilator are operative procedures that promise desired results.

Dry labor and retraction have been considered at some length not for the purpose of advocating use of an artificial dilator in every case

where membranes rupture early and the head is retarded at the inlet. Many require no treatment; and the presenting-part would be found in the mid-pelvis by the time such a procedure could be carried out. In others, a single dose of morphine combined with atropine produces sufficient muscular relaxation for retraction to be recovered from and for the head to advance. On the other hand, purpose of the discussion has been to establish a conviction that, when delay at the inlet and dry labor are met and when the position is posterior, the difficulty is due primarily to failure in dilatation rather than to location of the occiput. Appropriate treatment will then be applied.

When the head is arrested at the pelvic inlet, or even in the high mid-pelvis provided the lower segment is incompletely thinned-out, the writer considers delivery by internal podalic version and breech extraction a positive indication in all cases where vaginal delivery is permissible. Forceps even in most competent hands give promise of no such freedom from fetal and maternal traumatisms as do skilfully performed version and extraction after the full possibilities of moulding have been realized. The fact that the occiput is posterior tends to make demand for the procedures greater. For reasons that are apparent, manual or instrumental rotation of high heads is impossible.

With the presenting part in the mid-pelvis, prophylactic measures are still of value. Postural treatment may be applied if the shoulders are unengaged. Active treatment is rarely called for. It is at the pelvic outlet that incomplete dilatation and failure in rotation are met. On occasion, however, advance of a well-flexed head is retarded. The difficulty is due to disproportion and to it treatment should be directed. If associated with dilatation as is common, manual or hydrostatic aid is indicated. Here, manual rotation is difficult because of disproportion; and it is unnecessary because full dilatation may be presumed to be followed by spontaneous anterior rotation.

Rupture of membranes at this point predisposes to incomplete dilatation and retraction. Onset of the latter is guarded against as the patient is kept in bed and fluid accordingly permitted to escape slowly. With the appearance of retraction sufficient to obstruct labor, deep ether anesthesia and as complete cervical and lower segment dilatation as is possible are indicated.

As the presenting-part transverses the pelvic cavity, moulding and size of caput are increasing. They are important: they will be found to explain the unsuccessful attempts at "increasing flexion" at the pelvic outlet.

With the head at the pelvic outlet postural treatment serves no purpose. Shoulders have invariably engaged and the occiput remains posterior while the back cannot be brought forward because the shoulders are fixed. Treatment of lack of advance is active, that is

it is mechanical; and the procedures available are determined by the causes of delay. They are incomplete dilatation, ineffectual contractions, insufficiency of pelvic floor, and presence of deflexion. It is rare for a single one to be responsible for delay. The latter results more often from combinations of them and treatment is based upon their analysis.

Until the cervix is fully dilated and spontaneous rotation has failed there is no point in effecting manual rotation of the occiput. Causes of failure in dilatation should be attacked. If due to moderate disproportion, there is usually associated a degree of retraction sufficient to contraindicate the use of pituitary extract in an attempt to make the muscle complete the dilatation spontaneously. The condition is common in primiparae. When contractions are frequent, prolonged and propulsive and complete dilatation has yet to occur, complete relaxation of the lower uterus by means of ether is followed by careful manual dilatation and pushing of the relaxed lower segment up over the presenting-part that may have been fixed in its position by application of forceps. Under similar conditions, in multiparae, when a thin rim of unobliterated internal os retards complete dilatation, manual dilatation removes the one barrier to spontaneous anterior rotation and advance. In the presence of retraction sufficient to have increased the thickness of cervix and lower segment and to have made them edematous, a hydrostatic dilator accomplishes more satisfactory though less quick results than the hand. Use of ether not only relaxes tone the incompletely dilated cervix may present but also makes it possible for the examining hand to be carried well up along-side of the presenting-part and region of the contraction ring palpated for evidence of tone. If failure in dilatation is due to firm grasp of the tonically contracted ring—and such is not infrequently the case—the latter becomes the primary cause of delay and must be removed by deep, surgical, ether anesthesia.

When uterine inertia explains the delay, treatment depends upon cause of muscular inaction. If secondary to a distended bladder or rectum, initial treatment is obvious. If the result of actual or approaching exhaustion, the temptation to stimulate with pituitary extract must be resisted; for any temporary response would be followed by more profound postpartum inertia as a result of which bleeding, due to atony, would be inevitable. Here, failing uterine force should be anticipated: it should be supplemented by artificial dilatation followed by conservative forceps delivery accomplished in the presence of the gradually-failing contractions.

Finally, complete dilatation is often possible only as membranes are ruptured artificially. Pressure within the sac in front of a tight-fitting head may be too low to result in spontaneous rupture. When the fluid is made to escape, contractions increase in strength, firm

resistance of the head meets thin rim of undilated cervix, and complete dilatation of the latter speedily follows.

Regardless of complete dilatation, rotation fails when contractions are ineffectual. They may be so characterized when they fail to produce results. This does not mean that uterine-muscle efforts have necessarily ceased. There may be coming and frequent intervals and subjective "pain" may even be increased, but they are not accomplishing results in the particular case. They are relatively inefficient either because size of passenger calls for more strength of muscle to make it advance or because contractions are not transmitted to the cervix in such a way that it dilates. The former is met in cases of relative pelvic contraction; the latter in those of retraction and tonic contraction ring.

The clinical course of relative inertia is constant: muscular efforts get progressively weaker. That actual inertia may not develop during labor, and particularly at its termination, it is imperative that relative inertia be treated.

Two methods suggest themselves. First, stimulate the uterine muscle and make it work harder. For this purpose it is presumed a conservative dose of pituitary extract, 3 or 4 minims, would be administered. If disproportion were marked, immediate effect would be disappointing; for little increased efficiency can be expected of muscle that has already shown itself unequal to the task before it. The remote effect would be dangerous; for the scant supply of reserve muscle energy possessed by the uterus would be exhausted and a more pronounced inertia, with its untoward possibilities, would follow termination of labor. Even if disproportion were slight and spontaneous delivery were to follow active stimulation, the third stage and the postpartum hour would be entered upon with the uterine muscle still further depleted of its energy. On the other hand, were the failure of contractions to produce results due to retraction, no argument is needed to establish the fact that the situation produced is far more grave than that for which treatment was applied. Experience proves that a moderately prominent contraction ring may acquire a rigidity following pituitary stimulation that the most profound anesthesia cannot relax sufficiently for a live child to be delivered through it. Uterine stimulation, particularly that produced by pituitary extract, has an important place in obstetric therapeutics. However, its field is not treatment of lack of advance due either to failing musculature or to retraction.

Second, conserve inadequate or ineffectual muscular energy by helping the uterus to do its work. Dilate the cervix in a manner earlier described and facilitate subsequent anterior rotation and advance by supplementing each expulsive effort. If application of forceps is decided upon, exert traction when, and only for as long as,

the uterus contracts. This procedure conserves uterine muscle energy and, at the same time, lessens the amount of forceps pressure and traction to which the presenting-part is subjected.

There is one group of cases to which this conservative type of advance is not suited. When retraction has gone unnoticed, the musculature acquires a tone that can be relieved sufficiently by anesthesia for the child to be advanced through it but that sets itself up again so readily when the stimulating effects of the instrument and beginning traction are brought to bear upon it that delivery must be accomplished in the absence of uterine contractions. Increased force necessary to produce advance under these conditions, however, is much less than would be required were all-possible tone not removed by the use of ether.

With inertia treated along the lines suggested, the third stage and the puerperium are entered upon with the uterine muscle possessing enough contractile energy to preserve the tone that decreases the danger of hemorrhage and that favors satisfactory involution.

In treating delay in advance due to insufficiency of pelvic floor and deflexion, two procedures suggest themselves: first, correction of them and, second, substitution of adequate forces for those that are deficient or wholly inert.

Correction promises little. It is apparent that nothing can be done at this time to restore physiological tone to a relaxed or lacerated pelvic floor. Little more can be accomplished when attempt is made to favor anterior rotation by increasing flexion of the head. In an interval between contractions, the brow can be retarded (or raised) in a satisfactory attempt at increasing flexion; but any momentary advantage is lost as soon as contraction is set up. Then the head advances and reassumes its original position in relation with the cervix; because, as a result of moulding and caput-formation that have been going on since dilatation began, the presenting-part has accommodated itself to general shape of the lower uterus and assumption of the new position of flexion is improbable. This is especially true of cases that need correction most.

Little argument is necessary to dissuade the operator from attempts to secure satisfactory anterior rotation under these conditions by stimulating the uterus to increased activity. If condition of pelvic floor and deflexion make rotation in the presence of normal uterine action impossible, it is unreasonable to suppose rotation would be produced were strength of contractions to be increased. In the presence of heightened uterine action, the head may descend deeper but position of the occiput remains unchanged.

More direct, much more efficient and, therefore, more satisfactory treatment consists in producing anterior rotation artificially. The occiput is brought toward the front. From this point, advance is un-

eventful unless the situation is complicated by inefficiency of contractions, when artificial advance may well be considered as a conservative measure.

Manual rotation is difficult and often impossible if the head is large. Even if relatively small, resumption of the posterior position invariably follows the procedure unless both back and shoulders have been made to rotate anteriorly at the same time. With the head at the outlet, this is possible only as the shoulders and upper trunk are raised out of the pelvic cavity and forcibly rotated. The procedure is not always easy even though the uterus is relaxed sufficiently to permit it. Invariably the possibility of prolapse of cord is invited. Insistence that immediate delivery by version and extraction is possible should the cord advance hardly justifies assumption of the risks involved. Further, space sufficient to permit of the necessary introduction of the hand alongside of the presenting part would invariably allow of easy introduction of forceps and of as simple an instrumental rotation of the occiput. Forceps not only keep the occiput in anterior position; but they also make subsequent advance possible were the latter indicated.

A procedure that is both simple and effectual in suitable cases may well be described. Not infrequently in primiparae where the head is well flexed, delay in rotation due to slight relative disproportion at the pelvic outlet is met. One or the other ischial spine commonly interferes with rotation. Here a finger in the rectum can be made to "hook" the occiput forward. Flexion makes the procedure possible and is still further increased as a result of it. For the latter reason, speedy anterior rotation often results. When deflexion exists, the procedure is ineffectual; the occiput is too far behind and too high for the curved finger to get behind it.

When the cervix is fully dilated and posterior position persists, lack of advance is best treated by instrumental rotation followed, when indicated, by advance and delivery. Rotation and advance are two separate procedures and traction on the head should not be exerted until the occiput has been rotated well anteriorly. When exerted while the occiput is posterior, deflexion can with difficulty be corrected—it may even be increased—because pull of the forceps is from the front. On the other hand, increased flexion as anterior advance progresses is desired in order that resistance may be diminished.

Preliminary to forceps application exact location of the occiput must be known. The too-frequent delivery of posteriors with face to the front is evidence that this precaution is often not taken, for it is inconceivable that the operator would elect to deliver the case occiput-to-the-rear. An application, as indifferent as has been his attitude toward locating the occiput, is secured; firm traction is ap-

plied; the occiput rotates the shorter distance, posteriorly, into hollow of the sacrum; and the head is subsequently delivered in the manner described. The occiput has been rotated artificially to the rear. This should not be confused with the spontaneous occipito-sacral mechanism not infrequent in multiparae but encountered in full-term primiparae with the rarest of exceptions. This method of instrumental delivery is undesirable because of the danger of extensive perineal injury that is involved. For this reason, it will not be considered an elective method of delivery. Its utility is extremely limited even as an emergency procedure.

The double application of forceps is a familiar method of producing advance. Although the initial application is cephalic it is "inverted," and tractile force will inevitably be transmitted to middle and anterior part of the head, either preserving or actually producing deflexion, when advance is brought about before rotation has been accomplished. On the other hand, preliminary rotation in the mid-pelvis with two blades applied may be difficult because of bony resistance encountered.

Bearing in mind that as complete anterior rotation as is possible should be secured before advance is brought about, rotation is easily accomplished and flexion not only preserved but even produced in some cases of deflexion when the persistent occiput-posterior is treated in the following manner.

Position of the occiput is determined with accuracy. If to the right, the same (right) blade is inserted posteriorly and directed inward until its cephalic curve is applied to the side of the child's head. That the tip may rest approximately in the mid-line of the pelvis, the handle must be kept slightly to the operator's left. The handle is now grasped and the occiput "lifted" toward the front as the handle is both turned upon itself to the right and brought into the mid-line. This procedure may be facilitated by inserting the left hand into the vagina to aid in rotation of the occiput and, if necessary, to hold it in anterior position until the left blade can be applied.

If the first step has been successful, the occiput is directed at least to the maternal right and often forward of it and the brow to the left and often backward. Prominence of the brow toward the rear must be borne in mind when the left (or opposite) blade is placed in position.

The left blade is inserted posteriorly until its cephalic curve fits the head. Then it is swept to the operator's right upward over the face and finally brought to rest on the left side of the head. Configuration of the pelvic cavity and shape of the head make it necessary for the blade to change its direction frequently; and this is made possible by corresponding movements of the handle. With the cephalic curve of the blade, inserted posteriorly, in contact with

the right side of the head, the handle is directed slightly to the operator's right in order that tip of the blade may lie approximately in the mid-line. The handle is grasped and both raised and turned slightly to the left upon itself as the blade begins advance over the face; but, before the prominence of the brow is reached, the handle is directed to the operator's extreme left in order that the forehead may be passed rather than re-directed toward the front. The latter invariably results and the posterior position is resumed unless extreme care is exercised at this point. Turning the handle to the left upon itself is persisted in and the blade sweeps over the face. As the left side of the head is approached, the handle is directed sharply downward and toward the center as the blade is made to advance, under the pubic arch, until it rests on the left side of the head. The handles are now examined. Though they occupy the same plane (application being cephalic), they will not lock because the left, the blade that must be the lower, is actually the upper. The difficulty is speedily remedied by sweeping one over the other until the left rests under the right, when they lock readily. Application is now a true cephalic and the head lies at least in the transverse diameter. If for no other reason than because tips of the forceps are directed toward the occiput, anterior rotation is easily accomplished by simple rotation of the instrument. If rotation is retarded, traction may be employed with the knowledge that flexion is being produced because pull is being exerted from the region of the occiput.

The procedure is obviously applicable to medium and low rather than to high positions of the presenting-part. Provided the precautions to advance the handle of the second blade well to the operator's left (in R.O.P. positions) as the brow is passed and to depress it sharply as shank of the instrument passes beneath the pubic arch are observed, this procedure promises most satisfactory results. If they are not carefully observed, the second blade actually re-directs the brow forward and the application is found to be an "inverted cephalic." In the L.O.P. position the procedure is the same, although left is substituted for right and the latter for the former when indicated. Since the left (or lower) blade is introduced first, the forceps will lock as soon as the second (or right) is placed in position.

Various steps of the operation are more easily carried out as the solid—rather than the fenestrated-blade—instrument is used.

In the rare instances in which the presenting-part elects to leave the birth-canal with the occiput directed to the rear, and in the still more infrequent instances in which the emergency demands that it be so delivered instrumentally, the probability of perineal laceration must be borne in mind. Danger of laceration is diminished as a method of delivery of the head that most closely simulates the physiological is practiced. That the broad head may escape by a diam-

eter at least approximating the sub-occipito-bregmatic, the brow is retarded if possible until the entire occiput region has passed over the perineum that should be supported by firm, general, upward pressure. Extension may now be permitted and the brow allowed to advance beneath the symphysis. In the presence of rigidity of the parts or of a long, thin perineal body, the danger of laceration is removed when episiotomy is done after the parts have been subjected to reasonable stretching and before actual laceration has occurred.

Treatment of the occiput posterior may be summarized as follows. Until the shoulders have become engaged, treatment that displaces the child's body toward the front and holds it there favors assumption of an anterior position by the occiput, provided the presenting-part is so located that the occiput can rotate. The latter may lie above or below but not in the inlet. After engagement of the shoulders, neither forward displacement of the body nor even manual rotation of the occiput gives hope of permanent assumption of an anterior position by the latter; for, when the rotating force is removed, the occiput re-assumes its anatomical relation to the shoulders. When labor is obstructed at the inlet or in the upper mid-pelvis and the occiput is posterior, the conditions to be treated are those that have caused obstruction, such as retraction and pelvic deformity, and not posterior position of the occiput. In other words, there is no treatment for the occiput posterior as such when labor is obstructed high up. When the presenting part rests in the low mid-pelvis or at the pelvic outlet and when anterior rotation and subsequent advance do not occur, treatment depends upon analysis of cause or causes of delay in the management of which the most important item is artificial aid in doing what nature is unable to do, in doing it in the way that most closely simulates nature, and in doing it before untoward results of delay demand it. The judicious use of forceps meets each of these requirements.

Attitude toward the occiput posterior should be one of active expectancy. As a result of it defects in mechanism are anticipated and, for this reason, treated more satisfactorily should they develop. Active expectancy applies treatment that is indicated; but it is not meddlesome. It is the opposite of a policy of mere "let alone" that results in treatment only when fully-developed abnormalities demand it. At such time it may be more difficult and less satisfactory.

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THE RESULTS OF FOLLOW-UP WORK WITH INFANTS IN A MATERNITY HOSPITAL*

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MUCH thought is being focused upon the many problems of child welfare, and in every field of pediatrics, whether it be among the newborn, nutritional, orthopedic, tuberculous, cardiac, or psychiatric, the desideratum is preventive medicine. It is this movement which has brought about such a marked reduction in infant mortality and morbidity, by the organization of clinics where these problems are studied.

There is, however, and always will be a concentration on the "present illness" of an infant, while other conditions observed by the physician will be deferred until that for which the patient is brought to the clinic is cleared. Unfortunately, as soon as the acute illness is taken care of the infant is not ordinarily brought back for further observation; and even were the patient to return to the already overcrowded clinics—which must primarily serve the sick—there would be little time or space to devote to an apparently healthy baby with a minor defect. This obtains particularly with the newborn. A mother leaves a maternity hospital after confinement with inadequate advice as to the care and management of her child. When difficulties arise she is guided by information from neighbors and friends, without benefit to her baby, and with a consequent loss of time in case of illness. We believe the only way to correct this situation is to establish postnatal clinics in all obstetrical hospitals where pediatricians will educate the mothers and take full charge of the infants.

The observations recorded in this paper are the results of one year's study (1921-1922) of 410 babies born at the Manhattan Maternity, where—with the sanction of the surgical staff of the hospital—we established such a clinic.

Over 90 per cent of the mothers were primiparae of the better working class. Being young, and having no knowledge of the care of children, they showed an unusual willingness to cooperate with us and follow our advice.

Routine of the Clinic.—The history of the confinement, the birth weight and the Wassermann reaction were noted on every chart. In

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addition to the hospital examination the infant received a complete examination, was weighed, and accurate measurements of the head, thorax and abdomen were made, and also the length and the size of fontanels recorded.

Two nurses were in attendance on every patient—one to assist with the undressing and examination, and the other to take weights, temperature and measurements. Our findings were recorded by a volunteer worker. Two social service workers carried out the follow-up work, visiting homes to help mothers carry out instructions whenever necessary. The babies returned once a week until the sixth week, then once every two weeks, and then once a month. However, some infants were seen as often as three times a week, if we felt it necessary.

We followed feeding and minor physical conditions. Interesting anomalies were also kept under our observation whenever possible. Acutely sick infants, or those requiring special treatment—such as eye cases or orthopedic cases—were transferred to special hospitals with which we kept in touch; after which the child returned to our clinic for advice on general hygiene and feeding. Many patients were followed throughout the first year.

General Hygiene.—At every visit many points of hygiene were stressed and we found that only by repetition could the best results be obtained. For example, one factor of great importance was the question of too much handling and rocking. It was by repeatedly stressing the point, together with the change from a crying and so-called colicky baby into a peaceful, contented infant when our directions were carried out, that made the mothers realize very soon how much easier it was for them if they were guided by us.

The questions of regularity of nursing, sleep, quiet, frequent bathing, leaving the mouth alone, shielding the eyes from strong lights, clothing, diapers, fresh air, were all gone into carefully and repeatedly.

Breast Feeding.—We had an excellent opportunity to encourage breast feeding inasmuch as these young mothers showed the same willingness to continue breast feeding as they did to follow out the measures of general hygiene. The fact that we were to follow the infant regularly, so that questions that arose could be referred to us, obviated a great deal of the nervousness of the mother which usually ensues at this period because of poor advice and excessive worry about the child's welfare.

A three-hour nursing schedule was advised in almost all normal cases, followed by a four-hour schedule at three months, and at this time a supplementary feeding was usually given.

The physiologic facts about breast secretion and feeding were ex-

plained to the mother, and the question of her diet and hygiene were emphasized. The following were the points stressed:

1. Worry is detrimental.

2. The child should be nursed from one breast at a time, because the more completely a breast is emptied the better it will secrete.

3. The latter part of the breast feeding is richer in fat than the early part.

4. The child gets most of its food in the first five minutes.

5. The child should be raised vertically after nursing to expel air swallowed, and then placed on its right side on an inclined plane.

6. Absolute regularity insures the proper filling of the breasts, and a proper appetite in the child.

7. Only plain boiled water is to be given, not sooner than two hours after feedings.

8. Mothers should eat well rounded meals, but at no time should they indulge excessively in any particular foods. It is not necessary to eliminate foods (such as tomatoes, oranges, etc.) except those that disagree.

9. Constipation in the mother should be corrected by diet and proper hygienic measures.

The Relation of Certain Abnormal Conditions of the Breast to Nursing.—Many infants are hurriedly taken off the breast because of some condition that might easily be corrected, such as sore or cracked nipples. It should be remembered that unless this apparently simple trouble is treated immediately and properly, there is the danger of the development of a breast abscess which may endanger the health and perhaps the life of the mother. These abnormal conditions were treated by local applications of compound tincture of benzoin, by instructing the mother to keep her nipples thoroughly dry between nursings, and in insistence upon nursing the infant from one breast at a time. In those cases where the cracks were so marked that pain and bleeding ensued and made nursing almost unbearable, the child was put on supplementary feedings, and then taken off entirely from the breast for several days, allowing the breasts to heal completely; after which breast feedings were easily reestablished. In the less severe cases it was only necessary to rest the breasts during the period of alternate supplementary feedings. No nipple shields were advised. In no instance, in our entire series, was it necessary to wean any child on account of sore nipples, nor yet did we have any cases of breast abscess.

With the cases of inverted nipples, or very small nipples, the mothers were taught to express as much breast milk as they could for each feeding, and complementary formulae were added. These babies

were fed as long as possible in this way, and then were completely weaned.

There were a fairly large number of breasts that did not secrete well for several weeks after the child was born. Complementary feedings were discouraged, however, and the mothers were advised that the child would not gain well for a while but that it was absolutely essential that it remain hungry in order to force a complete emptying of the breast at every feeding, and thus stimulate secretion. (Only in a few instances was it necessary to give complementary feedings.) The breasts under this regimen—with adequate diet for the mother—became sufficient for the child's needs.

Menstruation During Lactation.—After observing this large group of mothers and babies we were able to conclude that menstruation has very little effect upon the process of lactation. In the majority of cases absolutely no ill effect was noted. In a fair number, the infant was hungry and showed an inadequate gain during the week of menstruation. These observations agree with the majority of workers, and indicate definitely that no child should be weaned on account of menstruation.

Eczema and Urticaria from the Standpoint of Protein Sensitization.—We cannot here go into a complete discussion of this important phase of pediatric practice, except from the one standpoint that we are endeavoring to emphasize in this paper, namely the prophylaxis and treatment of newborn conditions in their incipiency. There were ten babies with eczema in our entire series of 410, seven of whom gave negative skin reactions to the various foods tested. A correction of the mother's diet and simple therapeutic measures cleared the condition, without recurrence. Two of the remaining cases reacted to egg albumen, and one to cow's milk. These three cases cleared up promptly when the excessive egg and milk intake of the mothers was curtailed; the children were subsequently desensitized by minute doses of the offending protein injected subcutaneously, and were entirely tolerant to the offending foods before it was necessary to give them these foods. If it were possible, therefore, to discover and properly treat this type of case long before the particular food the child is sensitive to is to be given, many of our infantile eczema, and subsequent asthma, cases would be eradicated.

Thrush.—The etiologic factor in the causation of thrush is well known, and the predisposing factors are variously attributed to malnutrition, diarrhea, lack of cleanliness, and the habit of cleansing the mouth of the newborn. It was rather surprising, therefore, that in this large group of well nourished and well cared for breast fed infants, we should have found a number of cases of thrush. We could not

trace this condtion to any of the above factors, except in a small minority of the patients. Knowing that the saccharomyces albicans thrives only in an acid medium, sweetened water seemed to be the logical predisposing factor. In endeavoring to elicit information with reference to the use of sweetened water, we asked, "How much sweetened water does the baby take?" To this query we received positive information of its use in all the patients with this disease. The importance of not giving sweetened water was again emphasized to these mothers. At this point we may call attention to the importance of actually following these infants: here were mothers who had been definitely instructed not to give sugar water, and yet they did so. For treatment a nurse instructed the mothers to paint the lesions once a day with 1 per cent formalin, or 1 per cent silver nitrate, and to gently wash the mouth with a solution of soda bicarbonate every two hours. Uniformly good results were obtained.

It may be highly probable that the diarrhea given as a predisposing factor in thrush may also be due to an excessive sugar intake.

The pediatrician has the valuable opportunity when such diseases arise of emphasizing the dangers of the use of sweets between meals; first, in the causation of thrush and diarrhea, second in the perversion of the normal sense of taste, and lastly as a factor in the production of carious teeth.

Umbilical Hernia.—In the 410 cases cared for, routine examination for umbilical hernia was made, and 63 per cent presented a normal umbilicus. Twenty-eight per cent of the infants presented slight umbilical hernias, or really what might be regarded as umbilical protrusions. These cases were strapped merely as a routine measure, as it is well known that these slight umbilical openings close spontaneously. Nine per cent, however, presented definite pathologic hernias which were treated energetically by reinforced adhesive strappings; these were carefully followed, being restrapped when the adhesive plaster loosened. The time for a complete closure of the hernia varied from two weeks to several months. We gather from our series, therefore, that the healing of a definite umbilical hernia with proper technic—as described in pediatric textbooks—takes a fairly long time, but the important point is that the hernia can be healed if it is followed intensively. The pediatrician never sees the end results of this sort of hernia, if it is permitted to go untreated, but it should be remembered that these umbilical hernias lead to a great deal of discomfort and ill health very often in later life—particularly in women. The responsibility rests almost entirely with the pediatrician to correct the defect at a time when it is most amenable to a simple process of treatment.

Umbilical Granulomata and Polypi.—Of our entire series of cases only three granulomata were seen and seven polypi (which speaks very well for the obstetrical service). These conditions, which are seen rather frequently in a general dispensary practice, are the result of poor management of the cord: the viscid discharge and the protruding polyp prevent the proper healing of the cord, and very often produce excoriation around the umbilicus. When an umbilical hernia is also present, healing of the hernia cannot be accomplished, unless the former condition is eradicated and the diagnosis of the condition is not always made unless one draws the skin around the umbilicus wide apart. The application of silver nitrate for the healing of the granulomata is sufficient. The polypi are best treated by tying off the pedicle with sterile silk suture. These polypi should never be cut, as serious hemorrhage may ensue. The polypi usually fall off twenty-four hours after being tied off.

Inguinal Hernia.—This was rare in our series, as only one case was observed. The hernia was treated by a truss made with a skein of worsted, which was changed frequently. The hernia was healed after seven weeks of such treatment. It was observed for six months, without any recurrence. This child was prevented, therefore, from future operation by this simple method which was, however, followed up intensively.

Rickets.—All the prematures, Italian and colored infants were treated as potential rachitics, and from the third month were given cod-liver oil, and sun exposures were advised. Head-sweating, rachitic beading and any other suggestive sign of rickets were carefully looked for; if found, these cases were treated as true rachitics. As a result we had no frank case of rickets develop in our series.

ANOMALIES AND CONDITIONS OF PATHOLOGIC INTEREST

In a clinic of the character mentioned here, we are interested primarily in feeding, hygiene and the correction of minor conditions. However, cases of pathologic interest are here seen at their very beginning, and observations can be made which are of practical interest. The following is a summary of the more interesting cases observed in this series.

Aniridia Followed by Glaucoma.—In this case the infant was born with a complete closure of the left pupil; the entire eye was smaller than the right. After the fourth month the eye progressively developed into a marked glaucoma. This did not interfere with the child's physical development otherwise. The child was referred to an eye clinic, where subsequent operation was performed.

Arrested Hydrocephalus.—From the second to the twelfth week this infant's head enlarged rapidly, the frontooccipital circumference in-

creasing from 40 cm. to 46 cm. (the average increase in circumference for the entire first year is only 10 cm.) The sutures remained wide apart, the anterior fontanel measuring 7 x 7 cm. At the thirteenth week the head stopped enlarging, and in the following five weeks only increased 1 cm. The sutures which were open for five months gradually began to fill in, and normal progression of the head development ensued. This child was observed for one year, and we regard the case as one of arrested hydrocephalus. Cod-liver oil was given from the third month.

Albinism.—One typical case was observed.

Superficial Facial Palsies.—These were observed in forceps cases. The average time for recovery was from 35 to 46 days. The only treatment prescribed was warm applications.

Cephalhematoma.—All the cases cleared entirely, with the exception of one in which the blood clot became calcified, and left a permanent calcified tumor about the size of an almond.

Mongolian Idiocy.—This infant was born of a para xiv, forty years of age. It was seen at twelve days of age, and died the following week. The case was typical, and suggests the exhaustion theory in this particular instance.

Mongolian Spots.—These interesting olive green pigmentations usually present in the sacral region were observed in the following races—Japanese, Porto Rican, Italian, Negro and Spanish. They do not always connote, therefore, negroid or Mongolian blood.

Congenital Amputation of Extremities.—An amputation of the left forearm and left foot was noted in one case. The mother was a para iv, and gave the suggestive information that her husband had beaten her and kicked her in the abdomen during pregnancy.

Pylorospasm and Pyloric Stenosis.—Three cases were observed. One case developed into a true pyloric stenosis. The parents refused hospital care. Atropine treatment was prescribed, but on account of the poor cooperation which was given, it is impossible to say whether the atropine was used, and how our orders were carried out. The infant died.

The second case did poorly on the atropine treatment at home, and the child was sent to the hospital. The diagnosis of pyloric stenosis was concurred in by the attending physicians, and when medical treatment was found ineffectual the child was finally operated upon. However, the child died shortly after the operation. At autopsy no tumor or other condition was found which would account for the projectile vomiting.

Medical treatment was also used in the third case, in which we had excellent cooperation in the home. Atropine was given until we gradually reached the maximum of $^{6}/_{1000}$ of a gr. six times a day. The

atropine was discontinued for one to two days at varying intervals, during the course of the treatment to note the progress of the case. The baby was one month old when the pylorospasm developed, and treatment was continued for a period of four months.

If one believes that all cases of pyloric stenosis are antedated by pylorospasm, then it is evident that the best results will be obtained when cases are seen early, as can be done in a clinic of this type.

Tuberculides with Pulmonary Tuberculosis.—At seven weeks this infant, who was thriving excellently on the breast, developed a cough, which persisted and became harsh. Asthmatoid and indeterminate râles were noted in the lungs. The temperature was normal. At ten weeks, pin-head sized papules appeared on the thighs, neck, face and body; these papules developed into vesicles and then presented umbilicated caseonecrotic centers which could be shelled out. It was at this time—the infant being twelve weeks old—the indeterminate râles persisting and cough continuing, that we diagnosed the skin lesions as tuberculides. The third cutaneous von Pirquet was positive. The infant was then sent to New York Nursery and Child's Hospital, where he died several weeks later. Autopsy revealed a diffuse, caseous pulmonary tuberculosis with markedly enlarged tracheobronchial lymph nodes.

The note of interest here is the observation of the development of a rare and extremely important skin lesion, which enabled us to change our antemortem diagnosis from that of a chronic bronchitis to pulmonary tuberculosis.

Congenital Heart Disease Without Murmur and Persistent Cyanosis.—This infant was born cyanosed, which persisted and was not relieved by crying or oxygen administration. The child lived for 5½ months, and throughout its life no murmur could ever be elicited, although the child returned to the clinic three times a week for examination. Gallop rhythm was heard quite frequently. The absence of murmur and the gallop rhythm were corroborated by several pediatricians. X-ray examinations disclosed nothing of diagnostic value. The blood study showed a polycythemia. At 4½ months the infant, who had been doing well up to this period, had several attacks of severe cyanosis (the cyanosis ordinarily having been of a livid greyish blue color) and was sent to the New York Nursery and Child's Hospital. At 5½ months the child died of cardiac failure.

Autopsy revealed congenital heart disease with the following complex malformations: a single auricle and a single ventricle (cor biloculare), with presistent truncus arteriosus and no septa separating the two auricles and the two ventricles; but an auriculoventricular septum separating the common auricle from the common ventricle. The pul-

monary veins were definite, but the pulmonary arteries were represented by small branches coming off the truncus arteriosus.

Comment.—There was no doubt of this case being a true congenital heart without ever showing any murmur; and it would appear that the persistent cyanosis (morbus ceruleus) can only be accounted for by such an incomplete heart, when this symptom is not due to pulmonary stenosis.

CONCLUSION AND SUMMARY

As we stated in our introduction not enough is being done for the proper care of the newborn and the training of the young mother. Clinics have been established for nutrition, etc., but a gap exists between the time when the mother leaves the maternity hospital and the time that she first seeks medical advice for her baby. This results in the development of many preventable conditions, and the impeded progress of her infant. We believe that this situation can be corrected best by the establishment of postnatal clinics in the maternity hospitals under the direction of pediatricians.

In recording our observations it has been our purpose to show what can be accomplished in such clinics:

1. In teaching the mother the proper hygiene and management of her child.

2. In the encouragement and maintenance of breast feeding.

3. In the prevention of disease and the correction of minor ailments.

4. In the opportunity afforded the physician to study the normal development, anomalies and diseases of the newborn.

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THE USE OF PITUITARY EXTRACT IN LABOR

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WITHIN the last few years the pendulum has been swinging violently back and forth in the employment of pituitrin in labor. Much has been demonstrated clinically for and against its use but only recently has any attempt been made to prove the clinical observations experimentally.[1] The writer has combined a clinical and experimental study on a number of unselected cases, the results of which are set forth in this paper.

In 1895 Oliver and Schaefer demonstrated the pressor action exerted by the extract of the posterior lobe of the pituitary body. Some years later, Dale showed its action on uterine muscle. However, not until 1909 has the attention of the medical profession been focused on the possible use of pituitrin in obstetrical practice. In that year Blair Bell employed it in postpartum hemorrhage, placenta previa and following cesarean section. Within a few years the extract had become so popular and universal that even midwives resorted to its use. Hardly an instance of normal or difficult labor seemed to contraindicate its use. Operative obstetrics was relegated to the past and pituitrin came forward as the panacea for difficult labor. Being employed universally, fatalities that resulted from other causes were ascribed to pituitrin. Cases of uterine rupture, asphyxiation and fatal compression of the fetus, and premature separation of the placenta were reported. As a natural consequence, a reaction took place and pituitrin was banished from the domain of obstetrics. It suffered an uncommon fate. Lack of knowledge of its indications and its indiscriminate use forced a very valuable remedy into discard.

METHOD OF STUDY

There are four divisions in parturition where pituitrin is employed: (1) To induce labor;[2] (2) During the first stage of labor; (3) During the second stage of labor,[3] and (4) After expulsion of the placenta.

The writer has made clinical observations on 60 unselected cases at the Mission Dispensary, Boston, Mass., and corroborated them by pharmacological experiments on patients in labor. The 60 patients included 21 primiparae and 39 multiparae. The multiparae varied from parae II to parae XII. Pituitrin was administered hypodermically into the muscle of the arm in doses varying from ¼ to 1 c.c., during the various periods of the first and second stages, and after delivery of the placenta. Clinical observations were made on the

following factors: (1) Time between injection and effect; (2) Length of time of total action; (3) Length of time of individual contractions; (4 Severity of contractions; (5) Relation to stage of labor; (6) Effect on primiparae and multiparae; (7) Injuries to cervix and perineum; (8) Presence of constriction rings of uterus; (9) Effect on the baby; and (10) Condition of uterus before and after expulsion of the placenta.

In these cases onset of contractions and their duration were judged by the palpating hand, the most accurate clinical method available. Frequent vaginal examinations were made during uterine contractions to ascertain the effect on the cervix and perineum.

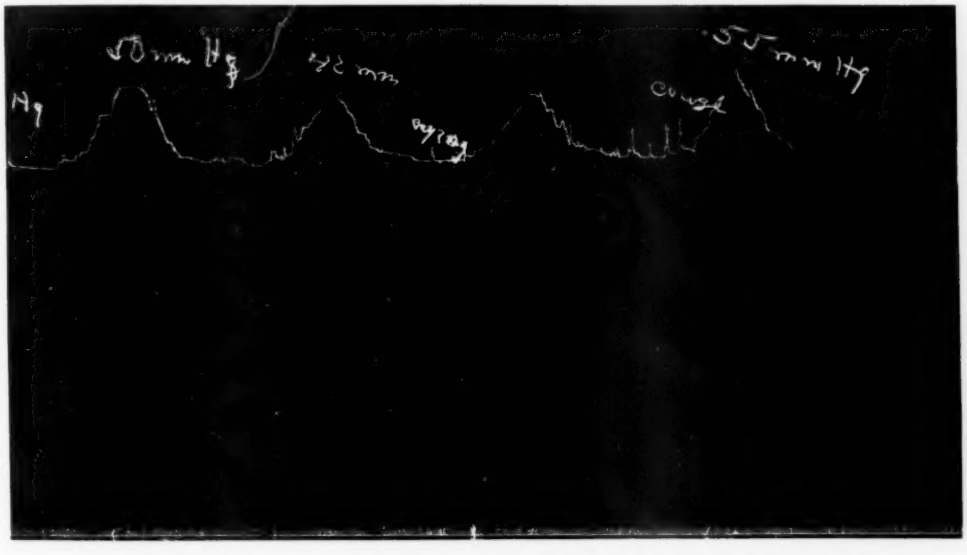

Fig. 1.—Patient early in the first stage. The Voorhees bag inserted into the uterus and attached to a mercury manometer and recorder. Time in seconds. Each wave represents a uterine contraction. At the height of each contraction the readings in mm. of mercury were recorded.

A second series was undertaken on six unselected cases, 2 primiparae and 4 multiparae at the Medical College of Virginia, Hospital Division. Five were in the first stage of labor and in the sixth case labor had not begun. The purpose of this series was to obtain accurate information concerning the nature of uterine contractions induced by pituitary extract. This was accomplished by inserting Voorhees bags through the cervical canal into the uterus and connecting the bag with a mercurial monometer from which a recorder produced tracings on a moving kymograph. Fig. 1 represents normal uterine contractions early in the first stage of labor. Readings in mm. of mercury were charted at the height of each contraction. Fig. 2 is a tracing of uterine contractions induced by pituitrin.

In order to obtain more distinct tracings, the mercury manometer

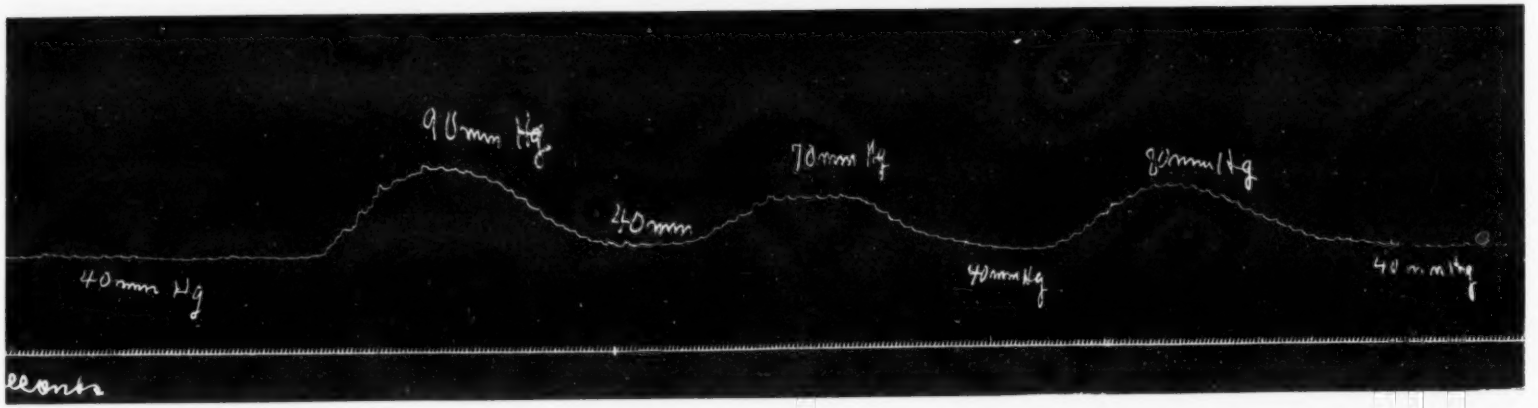

Fig. 2.—Patient in coma. Voorhees bag inserted into uterus and connected to mercury manometer and recorder. Two minims of pituitrin administered. Time in seconds. At the height of each contraction, readings in mm. of mercury were recorded. Note that each contraction returns to the base line, corresponding to 40 mm. of mercury. In this case labor was initiated with pituitrin. Note the close similarity to normal contractions.

was dispensed with in one case and recorder attached directly to the bag. Variations in pressure were obtained by means of a rubber membrane between the recorder and the bag. The water in the bag when under increased pressure from a uterine contraction pressed on the membrane and lifted the lever. Fig. 3 is a tracing of a normal

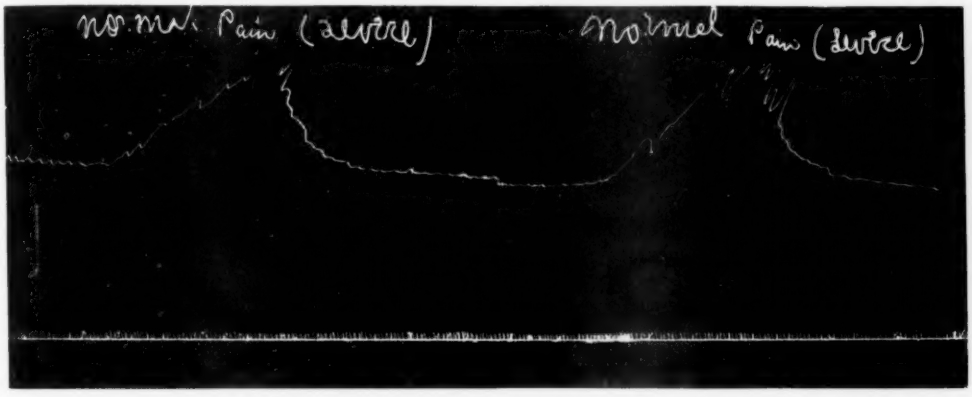

Fig. 3.—Patient early in the first stage. The Voorhees bag inserted into the uterus and recorder attached directly to bag. The two large waves are normal contractions of uterus. The small, superimposed waves are due to patient straining as well as respiratory movements. The time is in seconds. Note the short time of each contraction and the relative short interval between them.

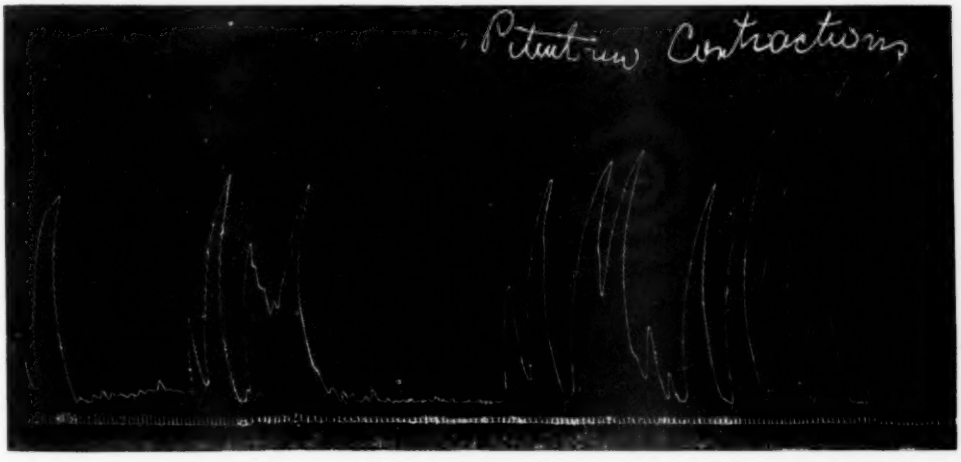

Fig. 4.—Same patient as in Fig. 3. Four minims of pituitrin administered. Time in seconds. Note the very short time of each contraction and each one reaching the base line. The two "camel back" contractions lasted only 12 seconds and then reached the base line. Note the long intervals between series of contractions. The pituitrin contractions came faster than the normal and the intervals between them were shorter.

uterine contraction. Fig. 4 represents uterine contractions induced with pituitrin.

Different methods were tried to obtain records of uterine contractions, but the one employed appeared the most satisfactory. External hysterography by means of modified pneumographs, elastic

bands, and those by Rübsamen's method proved unreliable, due to numerous extraneous factors. Abdominal contractions, respiratory motion, voluntary movements, and even pulsations of abdominal aorta obscured and modified whatever uterine tracings obtained.

RESULTS

In the series of 6 cases we obtained definite findings. The time between injection of pituitrin and its demonstrable effect on the uterus varied between one and a half and five minutes, the average being four minutes. Length of individual contractions was greater during the early part than at the end of the first stage. During the first half of the first stage the average time for each contraction was 58 seconds. In the latter part of labor contractions averaged 10 seconds but the intervals between them were greatly reduced. The intervals between contractions induced by pituitrin averaged 53 seconds. Longer periods of rest intervened between several contractions allowing the uterus a longer relaxation. The strength of uterine contractions measured in mm. of mercury averaged 71.5.

Normal contractions not induced by drugs lasted at an average of 73 seconds and the intervals between pains 83 seconds. The strength of contractions was at an average of 47 mm. of mercury.

NORMAL CONTRACTIONS

LENGTH OF TIME OF EACH CONTRACTION IN SECONDS	TIME OF INTERVALS IN SECONDS	STRENGTH OF CONTRACTIONS IN MM. OF MERCURY
56	93	40
80	90	55
61	90	45
66	101	60
62	65	35
66	62	
58	86	Average—47
54	86	
78		
59	Average—83 seconds	
61		
Average—73 seconds		

PITUITRIN CONTRACTIONS

LENGTH OF TIME OF EACH CONTRACTION IN SECONDS	TIME OF INTERVALS IN SECONDS	STRENGTH OF CONTRACTIONS IN MM. OF MERCURY
50	30	70
55	49	60
55	90	70
67	38	90
55	40	70
63	52	80
63	54	75
65	60	70
54	55	70
52		60
	Average—53.1	
Average—57.9		Average—71.5

In the 60 cases where clinical observations were conducted the time for pituitrin to take effect varied between 3 to 5 minutes. These observations were made in instances of uterine inertia where the patient ceased to have uterine contractions for a considerable length of time. Pituitrin was injected and the first appearance of contractions was assumed to be due to the drug. The length of each contraction lasted from 30 seconds to 90 seconds. The intervals between the contractions varied between 40 seconds and 2 minutes. It was observed that in primiparae contractions were stronger and lasted a shorter time than in multiparae. The pains were universally more severe than the normal. It was a matter of no particular skill to recognize pituitrin contractions. From a ¼ to 1 c.c. of the Parke and Davis preparation was used.

In no case did we initiate labor with pituitrin. Out of 7 cases with an os dilated 3 fingers, the head engaged and in the superior or middle strait with a ¼ c.c. of pituitrin, the baby was born within from 11 to 20 minutes. In 3 cases, out of the 7, there was a unilateral laceration of the cervix. In 6 cases, where the os was one or 2 fingers open and head engaged, contractions were stimulated and a rapid dilatation occurred without lacerations. But cervical lacerations are very apt to occur in these instances, as evidenced by the tension the cervix was subjected to and felt by the fingers of the writer. In the remaining 47 patients, pituitrin was administered when the os was fully or almost fully dilated, or the head on the perineum. In these cases, in the writer's opinion, there were definite indications for the employment of the drug. It was used in the following conditions: (1) In 16 cases of uterine stasis with the head arrested in the perineum; (2) In 12 cases where the patient had a prolonged labor with marked fatigue, the os was nearly fully dilated and head engaged; (3) In 8 cases of uterine inertia, the head arrested in mid-straits, os almost fully dilated and dilatable; (4) In 7 cases where contractions were getting weaker with above conditions present, and (5) In 4 cases with fetal complications as evidenced by change of heart sounds, head in mid-straits, os 4 fingers dilated and dilatable. In no instance was there any physical disproportion between the baby and the pelvis. Only one out of the 60 cases had a perineal laceration. The perineum was routinely ironed out manually. In one instance the breech was presenting.

In the 60 cases we have not noticed any fetal complications. No postpartum hemorrhage or maternal complications occurred. It was observed however, that if the birth was not accomplished within 30-40 minutes after administration of pituitrin, the third stage was prolonged from 10 to 20 minutes. One c.c. of pituitrin has been given in some cases after expulsion of the placenta. This tends to shut the sinuses and prevent accumulation of blood within the uterus.

Pituitrin was administered in the triceps of the arm. The area was scrubbed with soap and water. The hypodermic syringe and needle were boiled for a few minutes. No alcohol was used in sterilizing the area or the syringe, as it inhibits the action of pituitrin.

CONCLUSIONS

Pituitrin almost simulates in its action normal uterine contractions. Pituitrin pains are stronger, they do not last as long as normal pains and the intervals between pains are shortened. At no time was there tetany produced in our cases. When given in the first stage of labor, before complete or almost complete dilatation of the cervix, cervical lacerations may result In any pelvic malformation where the fetus is not expected to adapt itself to the passages, pituitrin should not be used. In those patients with repeated pregnancies, over 10, the uterus is apt to rupture under normal conditions and hence any additional force in form of pituitrin is dangerous. Contractions induced with pituitrin to initiate labor simulate normal contractions more than those which are induced during labor. Those labors hastened with pituitrin are less apt to develop cystoceles and rectoceles by shortening the time of pressure by the baby on perineal structures.

Pituitrin is indicated in the following conditions: (1) Prolonged labor; (2) Patient getting exhausted; (3) Uterine contractions getting weaker; (4) Uterine stasis with head in perineum, and (5) Fetal complications. In these indications the following conditions must be present: (1) Normal pelvis; (2) Engagement of the presenting part; (3) Fully, nearly fully or dilatable os, and (4) Preferably membranes ruptured.

In fact, any indication for forceps indicates use of pituitrin. Forceps necessitate the use of anesthesia, produce lacerations, endanger the fetus and expose the patient to infection by manipulation.

If the action of pituitrin simulates normal contractions we can assume that in small doses, as tried in one of our 6 cases, labor can be initiated.

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THE ROSENTHAL LIVER FUNCTION TEST IN OBSTETRICS.
(Preliminary Report)*

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PHENOLTETRACHLORPHTHALEIN was first prepared in 1908 by Orndorff and Block. In 1909 its properties were described; among them that it is excreted principally through the bile into the duodenal contents by the activities of the hepatic epithelium. In 1913, Rowntree, Hurwitz and Bloomfield advocated its use to determine functional activity of the liver in man. In dogs with biliary fistulae, they demonstrated that the dye appeared in the biliary secretion in fifteen minutes; also that in the collected feces of 48 hours, from 35-55 per cent could be recovered. Whipple, Mason and Peightal in 1913, showed by producing liver injury through phosphorus poisoning, prolonged chloroform administration, the induction of inflammatory processes or by alterations in the circulatory balance, that there was a decided fall in the dye output—that the percentage of output corresponded inversely to the amount of the injury produced and as repair took place the dye output proportionately increased. McLester and Frazier, 1915, and Kahn and Johnston, 1915, reported unfavorably on it owing to the variation in figures they found between normal and definitely pathological hepatic cases. Sisson, Chesney, Marshall and Rowntree, 1914, concluded that outspoken changes in liver function can be demonstrated by the test. Krumbhaar also believes the test has considerable possibilities for determining the functional capacity of the liver.

The disadvantages of the methods above used were: first, the necessity of a fresh preparation for each test due to the instability of the dye; secondly, difficulty in collecting all the feces passed in 48 hours; thirdly, the absorption of some of the dye by the large bowel; fourthly, the elaborate technic associated with the injection of a large amount of the fluid into the veins.

In 1916, McNeil modified the procedure. He inserted a duodenal tube, injected the dye into the veins, collected the duodenal contents, estimated the time of its first appearance and the percentage recovered over a period of two hours. Kahn, July, 1921, used the injection of phenoltetrachlorphthalein to study the efficacy of the method of Lyons to stimulate the flow of bile into the duodenum. Traces of the dye appeared in the duodenal contents within twenty minutes of the administration and the administration of magnesium sulphate in-

*Read before the St. Louis Medical Society, May 15, 1923.

traduodenally markedly stimulated the flow of bile as measured by the phenoltetrachlorphthalein output.

In 1921, Aaron, Beck and Schneider introduced a stable preparation of the dye. They reported 7 abnormal liver cases where the appearance of the dye varied from 15 to 75 minutes, averaging about 35 minutes; also 16 normal cases in which the time of the appearance of the dye varied from 14 to 20 minutes with the average of 17.2 minutes. They emphasized that the time of the appearance of the dye is important, and not the total quantity recovered. They felt that if its first appearance is delayed more than 20 minutes one should be suspicious of hepatic involvement.

In December, 1922, Rosenthal presented a new method dependent on the length of time the dye remains in the blood stream or the ability of the liver to remove the dye from the blood stream. Standards were prepared and matched with the unknown plasmas. The principle of the method is briefly as follows: 5 mg. of the dye per kilo of body-weight are injected intravenously. This dosage is normally removed from the blood stream very rapidly. In normal human beings 2-6 per cent is present in the plasma fifteen minutes after the injection, and practically complete disappearance takes place within from 40 to 60 minutes. In cases of liver disease, high percentages may be found in the plasma for many hours after injection. The same author presented 10 normal individuals and 10 cases of extrahepatic disease and finds normal curves in all cases. He found high degrees of retention in cases of hepatic disease.

In March, 1923, Deakin and Graham concluded that phenoltetrachlorphthalein is not a satisfactory substance to use in an hepatic functional test based on the quantitative estimation of the output in the bile.

Rosenfield and Schneiders, December, 1922, applied the test in pregnancy and its toxemias. In six cases of normal pregnancy in the third trimester, there was no retention of the dye in the blood. Figures were practically the same as in normal non-pregnant women. They studied 16 toxemic cases: In the neurotic and toxic vomiting group (7 cases) there was a very definite relation between the degree of toxicity of the patient as evidenced by the clinical picture and the degree of functional impairment of the liver as evidenced by the test. The question arises as to the anticipation of the clinical picture by the results of the test. The method has proved valuable in diagnosing the neurotic type of vomiting. In the hypertension group the results indicated that there has been liver function impairment in every case in which there has been sufficient clinical evidence to warrant a diagnosis of pre-eclampsia or eclampsia. Wherever the clinical picture showed a considerable degree of toxicity, curves were obtained which indicated corresponding degrees of impairment of function. In several instances, however, the test indicated degrees of toxicity more severe than the corre-

sponding clinical picture suggested. Further development in these patients, however, showed definite accentuation of the clinical symptoms, suggesting that the test curve preceded the clinical picture in evidencing toxicity.

Hourly blood pressure estimation in cases of pre-eclamptic toxemia have shown variations at various intervals, fluctuating from considerable degrees of hypertension to approximately normal levels within short periods of time, in cases in which the test curve has consistently shown definite impairment and in which subsequent developments proved definitely marked toxicity. This suggests that greater reliance might be placed on this test than on blood pressure determinations or other variable clinical symptoms. Whenever, in cases of toxemia the patients have been relieved from symptoms, either by treatment or delivery, the test curves have fallen to normal limits, showing rapid return to normal liver function. The time required in these cases apparently varies directly with the degree of liver impairment.

The material we are presenting is merely a preliminary report on a series of liver function tests by the Rosenthal method done on patients on the obstetrical service of Barnes Hospital and the Washington University Dispensary.

NORMAL CASES

NO.	AGE	GRAV.	GESTATION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST		
							15′	60′	120′
1 B.	20	iii.	14	92/56 to 108/58	No. Alb.	Constipated Headaches	7	0	0
2 W.	23	ii.	18	110/70	No. Alb.	None	7	0	0
3 B.	21	i.	18	94/54 to 110/78	No. Alb.	Headaches relieved by catharsis	3	0	0
4 B.	24	iii.	24	116/78 to 120/80	No. Alb.	Headaches only very rarely	6	0	0
5 B.	20	i.	24	106/60	No. Alb.	None	2–	0	0
6 W.	23	i.	26	105/68	No. Alb.	Headaches Ethmoid Sinusitis	2	0	0
7 B.	18	i.	29	102/70 to 105/72	No. Alb.	None	3	0	0
8 B.	29	iii.	30	104/62	No. Alb.	None	4	0	0
9 W.	?	i.	30	110/50	No. Alb.	None	3	0	0
10 B.	18	ii.	33	102/60 to 104/60	No. Alb.	None	5	0	0
11 B.	17	ii.	38	98/70 to 112/78	No. Alb.		7	0	0
12 W.	29	ii.	39	110/62 to 126/70	No. Alb.	None	4	0	0

The above series is one of cases of normal pregnancy at various periods of gestation. All the readings are within normal limits. There is no apparent difference in the removal of the dye from the blood stream in the various stages of pregnancy. Tests have not as yet been run on the same patients at several stages of the same pregnancy.

PRE-ECLAMPTIC TOXEMIA

NO.	AGE	GRAV.	GESTATION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST 15′	TEST 60′	TEST 120′
1 W.	23	i.	40	124/90 to 154–84	Trace Alb.	Vomiting. Edema of extremities. Headaches	10	8	2–
2 W.	29	ii.	29	102/78 to 210/130	Trace Alb.	Headaches Epigastric burning Edema. Spots before eyes	14	6	4
3 W. a.	17	i.	37	128/82 to 138/90	Trace Alb.	Decreased urination. Epigastric burning.	7	9	4
b.	4 wks.	later	Post-Partum	110/70	Very faint trace	None	5	2–	0
4 W. a.	19	i.	40	102/68 to 136/72	Faint trace	Headaches Sleeps poorly Epigastric burning.	6	3	0
b.			Post-Partum	110/65	Very faint trace	Delivered of macerated fetus	6	0	0

Cases 1 and 3 complained of headaches and constipation. Relief of the latter was followed by disappearance of the headaches, so they were probably not of toxic origin and we should not expect any liver impairment, as the tests show.

Case 4 was troubled with very severe headaches due to an ethmoidal sinusitis.

Case 1 gave the rather typical history of pre-eclampsia. The non-protein nitrogen and uric acid determinations in the blood were normal, as was the phenolsulphonephthalein kidney functional test. We considered this case to have moderate liver impairment. No test was run in this case following delivery.

HIGH BLOOD PRESSURE CASES WITH SYMPTOMS

NO.	AGE	GRAV.	GESTATION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST 15′	TEST 60′	TEST 120′
1 B.	27	v.	31	105/70 to 132/78	Very faint trace	Nausea Vomiting Headaches Edema	7	3	0
2 B.	16	ii.	32	110/78 to 130/90	No Alb.	Headaches Vomiting	8	5	0
3 B.	23	i.	29	110/66 to 164/104	Very faint trace	Headaches Sleeps poorly	7	5	0
4 B.	18	i.	33	135/85 to 146/90	No Alb.	Headaches Constipated	10	6	0
5 B.	22	i.	30	120/70 to 140–90	No Alb.	Headaches Edema	5	3	0
6 B.	24	iii.	31	110/65 to 146/88	No Alb.	Headaches	6	4	0
7 B.	27	vi.	13	268/170	Mod. amount Alb. Casts	Headaches Vomiting Edema of Feet. Nausea Blurred vision	6	0	0

Case 2 gave a history of severe toxemia in the previous pregnancy. Patient was sent to the hospital because of rapidly rising blood pressure, headache and severe epigastric discomfort. Patient went into spontaneous labor; delivered of a premature stillborn fetus. The test was not run until the 5th day postpartum and showed very marked liver impairment. Subsequent tests were not done because of inability to find suitable veins.

Case 3 entered the hospital with symptoms of pre-eclampsia. The liver function test showed marked liver impairment. Clinically the patient improved rapidly under eliminative treatment and was discharged from the hospital. Another test was run four weeks later, which was ten days postpartum, and it gave normal findings.

Case 4 entered the hospital with symptoms of mild pre-eclamptic toxemia. Liver test showed very slight liver impairment. Patient delivered of a macerated fetus the next day. Test repeated postpartum was normal.

Several of these cases are of particular interest.

Case 2 had the test when blood pressure and urinalysis were normal. One week later patient returned with a blood pressure of 130/90 (previously it was 110/70) and a small amount of albumen in the urine. The test showed moderate impairment of liver function. This case would suggest that the liver damage anticipates the blood pressure elevation and urinary findings.

Case 3 had a blood pressure of 164/104 during pregnancy, with lowering of the same when on diet and eliminative treatment. Blood pressure has always been slightly elevated since its greatest height was reached and test was run after patient was treated. Test showed a moderate impairment suggesting that a potential toxemia existed.

Case 6 was a patient who had an elevated blood pressure throughout previous pregnancy.

Case 7 entered hospital in very early pregnancy with a history suggestive of chronic nephritis. Patient has had one premature delivery and 3 spontaneous miscarriages at 6 and 7 months gestation. The liver function test was normal. We consider the test in this connection as a means of probably differentiating renal from hepatic toxemias.

HIGH BLOOD PRESSURE CASES WITHOUT SYMPTOMS

NO.	AGE	GRAV.	GESTATION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST		
							15′	60′	120′
1 B.	24	iii.	36	128/78 to 148/78	No Alb.	None	3	0	0
2 B.	21	iii.	39	124/65 to 134/86	No Alb.	None	8	7	0
3 W.	22	ii.	36	120/70 to 140/70	No Alb.	None	11	4	0
4 B.	22	i.	30	120/74 to 138/76	No Alb.	None	3	0	0
5 W.	23	iv.	28	124/75 to 144/88	No Alb.	None	6	0	0
6 B.	24	ii.	27	128/76 to 148/82	No Alb.	None	7	3	0

The above series shows one-half of the cases with normal liver tests and the other with very moderate impairment. It will be interesting to follow these cases further during pregnancy to see if any of them later develop toxic symptoms. What in these cases without liver im-

pairment the blood pressure elevation is due to, we cannot say; however, it seems reasonable to assume that in these cases with liver impairment the elevated blood pressure is due to a toxemia which has not produced symptoms as yet.

NORMAL BLOOD PRESSURE WITH SYMPTOMS

NO.	AGE	GRAV.	GESTATION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST		
							15′	60′	120′
1 B.	18	i.	35	112/68 to 118/74	No Alb.	Headaches for 2 wks. Constipated	7	3	0
2 B.	19	ii.	26	105/60 to 112/58	Very faint trace	Nausea Vomiting Headaches Edema of feet	5	3	0
3 B.	21	i.	32	120/80 to 124/76	No Alb.	Edema of feet Headaches	8	4	0
4 B.	32	iii.	38	110/64	No Alb.	Sl. Edema Sl. Headaches Constipated	5	3	0
5 B. a.	16	i.	39	95/50 to 120/64	No Alb.	Headaches Edema of ankles	7	4	0
b.			Post-Partum	110/56	No Alb.	None	4	1	0
6 W.	27	v.	38	115/78 to 128/78	No Alb.	Headaches Nausea Vomiting	6	5	0
7 W. a.	19	ii.	40	110/48 to 118/75	No Alb.	Frequent Headaches	11	5	0
b.			Post-Partum	110/70	No Alb.	None	5	2	0
8 B. a.	21	ii.	40	108/72 to 122/80	No Alb.	Edema	2–	8	5
b.			Post-Partum	110/70	No Alb.	None	7	0	0

In this series of cases we see there was from very slight to moderate impairment of liver function. In all of the cases the blood pressure was within normal limits and in only one case was there an albuminuria. No conclusions can be drawn from this series, but the subsequent behavior will be of utmost interest to determine whether the blood pressure will rise and urine will show albumen and, with the symptoms, indicate a toxemia which the liver test certainly suggests.

Cases 5 and 7 showed normal function and very slight impairment in tests made following delivery.

Case 1 entered hospital because of intractable vomiting. Urine was negative except for a positive acetone reaction. Non-protein-nitrogen of blood was normal, ammonia coefficient of urine elevated, plasma carbonate within normal limits. Liver function test was normal at this time.

Patient was given glucose intravenously and by rectum. After treatment for several days and assurance that pregnancy must continue, patient's symptoms improved. Two days after cessation of vomiting and with marked subjective improvement the repeated test gave a normal result.

MISCELLANEOUS CASES

NO.	AGE	GRAV.	GESTATION	BLOOD PRESSURE	URINE	SYMPTOMS	TEST 15′	60′	120′
1 W. a.	38	viii.	11	110/60	No Alb. Acetone	Extreme Vomiting	5–	0	0
b.	1 week later			115/60	Faint trace alb. Acetone +	No vomiting for 2 days. Clinically improved.	4	2–	0
2 W.	42	?	2	120/80	Large amount Alb.	Puerperal Sepsis. Died 10 days later	14	14	14
3 W. a.	32	v.	36	110/74	No Alb. Acetone +	Recent vomiting, otherwise none	12	6	5
b.	Delivered dead fetus		Post-Partum	120/70	No Alb.	Psychosis before delivery. Anuria.	5	0	0
4 B.	38	Not pregnant		226/130	Large amount	None now Headaches. Dizziness. Blurred vision Headaches.	12	0	0
5 B.	43	xii.	16	120/90 to 175/120	Mod. amount	Blurred vision. Arterio-sclerosis Headaches.	8	3	0
6 W.	23	ii.	26	110/60	Trace	Advanced Pulmonary Tbc	2	0	0

Case 2 entered hospital as suffering from a puerperal infection following criminal abortion. Patient died of a general peritonitis. Liver test ten days before death proved very marked liver impairment. Section of the liver removed at autopsy showed considerable fatty infiltration around central vein, rather large amount of hemosiderin throughout section, rather marked round cell infiltration about portal spaces, but section generally showed liver not to be badly damaged, probably because of forced intravenous glucose administration.

Case 3 entered hospital with history of recent inability to retain food. The urine showed a strongly positive acetone reaction. The liver function test at this time showed very marked liver impairment. Several days later the patient developed a psychosis, an anuria with a non-protein-nitrogen in the blood of 83 mg. per 100 c.c. Patient went into premature labor and delivered a dead fetus. Ten days after delivery, when the N. P. N. was down to 29 mg. per 100 c.c. and the patient clinically well, without symptoms, the liver function test was normal.

Case 4 entered hospital as suspected nephritic toxemia. On examination patient was found not to be pregnant. The diagnosis of myocarditis, chronic cardiac valvular disease and chronic diffuse nephritis was made. The liver function test was practically normal.

Case 5 entered hospital with albuminuria and high blood pressure, complaining of headaches and blurred vision. Patient had a marked arterio-sclerosis, general. With bed rest symptoms abated and blood pressure dropped considerably. Liver function test on admission showed very slight impairment.

Case 6 entered hospital as a case of advanced tuberculosis and pregnancy of 26 weeks. Liver test normal.

BEFORE AND AFTER DELIVERY

NO.	BLOOD PRESSURE	URINE	SYMPTOMS	TIME	TEST		
					15′	60′	120′
1 a	128/82 to 138/90	Trace Alb.	Pre-eclamptic	Before delivery	7	9	4
b	110/70	Very faint trace	None	After delivery	5	2–	0
2 a	95/50 to 120/64	No Alb.	Edema Headaches	Before delivery	7	4–	0
b	110/56	No Alb.	None	After delivery	4	1	0
3 a	100/48 to 118/75	No Alb.	Frequent Headaches	Before delivery	11	5	0
b	110/70	No Alb.	None	After delivery	5	2	0
4 a	110/74	No Alb. Acetone +	Recent Vomiting	Before delivery	12	6	5
b	120/70	No Alb.	None	After delivery	5	0	0
5 a	102/68 to 136/72	Very faint trace	Pre-eclamptic	Before delivery	6	3	0
b	110/65	Very faint trace	None	After delivery	6	0	0
6 a	108/72 to 122/80	No Alb.	Edema	Before delivery	?	8	5
b	110/70	No Alb.	None	After delivery	4	0	0

In this series of cases readings were taken before and after delivery. In all cases there were symptoms present before delivery and in some of them elevated blood pressure and albuminuria. In all of the patients there was some retention of the dye in the blood stream before delivery. After delivery the symptoms cleared up in every instance; the urine improved in all but one case, in which it remained the same. The blood pressure almost universally became lower. The liver tests, 10 to 12 days postpartum, were uniformly within normal limits.

CONCLUSIONS

We are not prepared to draw any definite conclusions from a series so small as this one; however, the test seems to offer considerable promise in indicating the degree of toxicity in certain cases, gives a clue as to the response to treatment in others, probably indicates impending clinical toxemia in some instances, enables us to differentiate neurotic from toxic vomiting, and gives a better idea of how to evaluate a patient's symptoms, and the functional capacity of the liver under the added strain of pregnancy.

INTRAPARTUM AND POSTPARTUM STREPTOCOCCUS SEPTICEMIA OF EXTRAPELVIC ORIGIN

By Samuel A. Wolfe, M.D., Brooklyn, N. Y.

THE occurrence of a systemic infection arising from an extrapelvic focus and accompanying labor and the puerperium is unique and warrants report.

Case No. 446, 1921.—Mrs. J. M., para vi, was admitted in labor to Dr. Polak's Service at the Long Island College Hospital on January 26th, 1921. The patient had been under supervision in the prenatal clinic for three months. Previous labors and pregnancies normal. Present pregnancy uneventful until three days before admission at which time she complained of cough and sore throat.

Labor began noon January 26th. Notification of same at 8:15 P. M. Seen by outpatient service at 9 P. M. Examination showed temperature 102, pulse 116, respirations 24; face flushed; pharynx injected, few subcrepitant rales over both bases. Presentation R. S. A.; cervix 3 cm.; pains every four minutes. Admitted to hospital at 11:30 P. M. with similar findings. Blood count showed 9000 white cells, polys 83 per cent. Labor proceeded satisfactorily. At 8:50 A. M. (1/27) membranes ruptured spontaneously and living female was delivered spontaneously with the next two contractions. Third stage uneventful. Child weighed 3100 gm.; cried spontaneously but remained cyanotic. The progress of labor was followed throughout by rectal examination.

One hour after delivery temperature was 104, pulse 130, respiration 38. At this time throat showed white patch on left tonsil in addition to marked injection. Chest showed persistent râles. Second blood count 12 hours after labor showed (white cells, 24,000, polys 85 per cent; high for physiological count).

The puerperium was stormy and prolonged and can for purposes of brevity be divided into three phases.

The first period includes the 1st to 3rd days postpartum. In this interval the clinical course was characterized by absence of subjective symptoms. The physical signs in pharynx and lungs remained unchanged and uterine involution progressed normally. The temperature, however, continued a septic course and varied between 100^8 and 104^2; pulse persisted between 120 and 140 and respiration between 30 and 40 (see Fig. 2).

Laboratory Data:

1/28/22 (1st P. P.) W. B. C. 17,200, Polys 83 per cent.
Blood culture sterile.
Widal: Negative.
Stool: Negative for typhoid and paratyphoid.

1/29/22 (2nd P. P.) W. B. C. 10,000, Polys 80 per cent.

Cough controlled by heroin; heart good quality under caffeine stimulation.

The baby which was cyanotic at birth remained in this condition; dyspnea was marked and continued until its death at 11 P. M. on 1/27/22. Temperature was never above 99^2. The autopsy performed 1/28/22 showed septic bronchopneumonia and general septicaemia. The details are as follows:

Gross.—Umbilicus and umbilican vein normal. All abdominal viscera normal except for postmortem change.

Thorax reveals normal heart and pericardium. Lungs: Rt. floats but is heavy and dark red; scattered throughout are grey-red nodules 2-3 mm. in diameter corresponding sharply to the lobules. A mottling due to atelectasis is seen on the surface. Left lung in its upper lobe contains nearly three confluent areas of consolidation about 15 mm. in diameter. These are yellow-grey in color, soft and nearly fluid. A similar area is found in the posterior surface of lower lobe. Findings otherwise similar to right lung.

Brain: vessels over convexity show hypostatic congestion otherwise normal.

Microscopic.—Abdominal viscera show usual postmortem change in all organs.

Fig. 1.—The microphotograph shows the severity of the interstitial form of bronchopneumonia of only 16 hours' duration. Note the necrotic area.

Chest: Lungs.—In many lobules the bronchioles are normal and lung tissue normal or collapsed. In others, bronchioles are filled with purulent exudate, walls normal but the adjacent alveoli are filled with exudate of mononuclears and transitionals with small number of polys and red blood cells. In other lobules bronchioles filled with pus which is partially necrotic and the adjacent alveoli (both exudate and lung tissue) are in state of necrosis. The septa are edematous and contain inflammatory cells. These findings are well shown in the microphotograph (Fig. 1).

Bacteriological.—Cultures from the lung, heart and spleen showed growth of hemolytic streptococcus.

Diagnosis: Septicemia; bronchopneumonia—(Interstitial).

Bronchopneumonic lesions more advanced and severe than ordinarily found for 14 hours' duration, suggesting antepartum infection.

The second phase of the puerperium includes the 4th to 10th days postpartum. Clinically it was marked by severe septic intoxication manifested by disorientation, and attacks of mania. The onset was sudden in the morning of the 4th day and was associated with cyanosis. Examination showed persisting patch on the left tonsil; throat injected; fine rales over both lung bases; heart sounds weak. Abdomen negative; uterus insensitive, 8 cm. above symphysis. Digalen m xx, q. 3 h; glucose-soda by Harris drip and scopolamine gr. $\frac{1}{200}$, hypodermoclysis 900 c.c.

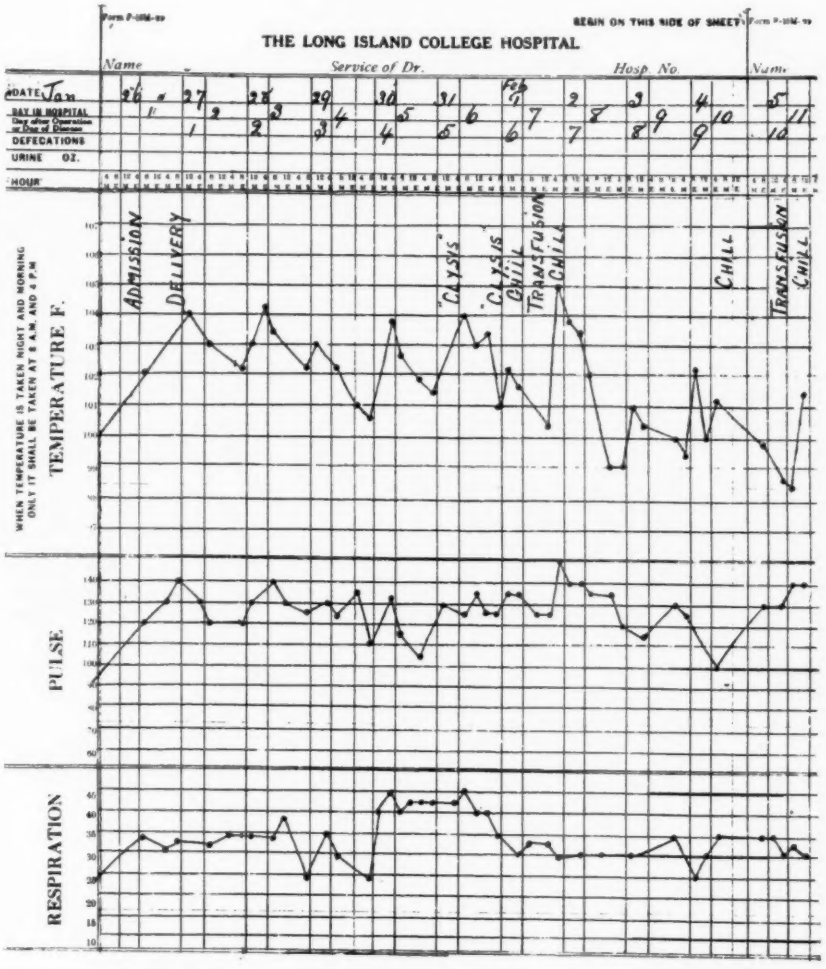

Fig. 2.—Shows the temperature, pulse and respiration for the first 10 days of illness. The fall in temperature following blood transfusion is striking.

On the fifth day patient was dull, apathetic and disoriented. A chill lasting 20 minutes occurred at 4 A. M. Blood transfusion of 300 c.c. was given at 7 P. M. by the citrate method. Following this the temperature fell, mentality cleared, patient taking medications and fluid greedily. This continued until the 8th day when mania recurred with rise of temperature. Examination showed patch on left tonsil gone and only an occasional rale.

On the ninth day remission set in, patient rational; sphincteric control regained;

pulse good quality with occasional rale over bases. A second transfusion of 275 c.c. given.

The temperature in the second phase varied from 101 to 104, the pulse between 103 and 150 and respirations between 20 and 40 (see Fig. 2).

Laboratory Data:

1/31/22 (4th P.P.) W. B. C. 6,000—P 82

Pharyngeal and tonsillar cultures show hemolytic streptococci with some staphylococci. Uterine culture shows hemolytic streptococci. The organisms obtained from the mother like those of fetal origin ferment lactose and salicin but not mannite and insulin and hence seem morphologically and biologically the same.

2/1/22 (5th P. P.)	W. B. C. 6,000—P 72 Hb. 70	
2/2/22 (6th P. P.)	" 8,000—P 85 Hb. 85	
2/3/22 (7th P. P.)	" 9,000—P 82 Blood culture positive for hemolytic streptococci	
2/5/22 (9th P. P.)	" 8,000—P 83	
2/6/22 (10th P. P.)	" 10,000—P 72	

The third clinical phase of the puerperium continued from the 10th to 55th day postpartum. This interval was characterized by numerous metastatic abscesses of the buttocks, thighs, legs and arms. The throat and chest symptoms disappeared. The pelvis was found normal on the 10th day with good uterine involution. General condition was excellent. The number of abscesses was twelve. These were deep, required incision and drainage. Cultures from the pus revealed hemolytic streptococci. The temperature remained 98s except for irregular rises with abscess development and dropped to normal with incision and drainage.

The patient was discharged on the 77th day, all abscesses fully healed; general examination negative. Pelvis normal except for old lacerations.

COMMENT

Review of the facts in this case lead to the following possibilities:

1. The streptococcus sore throat caused maternal antepartum bacteriemia and in turn fetal infection. The pathological lesion in the child's lung of an interstitial type and the necrotic areas form quite a different picture from an aspiratory pneumonia which might have occurred at the time of birth. The type of lesion and its severity, associated with clinical symptoms of cyanosis and dyspnea at the time of delivery, point to a process beginning before birth and hence placental transmission and fetal septicemia. The streptococci recovered from the heart's blood, spleen and lungs show the latter. The pneumonia was secondary to the septicemia; interstitial pneumonia is a septic process.

2. The maternal infection persisted after labor as shown by finding the hemolytic streptococcus in the uterus on the fourth day. These organisms showing the same sugar fermentations as those derived from mother's throat and fetal organs suggests infection of hematogenous origin rather than an ascending process from the vagina.

3. Recovery of organisms from the blood stream on the 7th day in

presence of severe toxic symptoms indicates septicemia. The disappearance of general symptoms with simultaneous occurrences of metastatic abscesses yielding the hemolytic streptococcus supports the clinical course of a septic pyemia.

4. The similarity in morphology and sugar fermentation of the organisms recovered from the uterus and blood stream to those from the mother's throat and fetal organs suggests a common source which by exclusion is to be the tonsil.

1530 PRESIDENT STREET.

ABDOMINAL PREGNANCY WITH FAVORABLE OUTCOME AT TERM—REPORT OF A CASE

BY CHARLES H. BROWN, M.D., F.A.C.S., WATERBURY, CONN.

CASES of abdominal pregnancy that almost run the course of a normal pregnancy, terminating in a healthy baby of normal weight and development, are, we believe, sufficiently rare to warrant the full report of such cases. The case here reported is of this kind, in which no untoward event was suffered by either mother or child.

The woman in question, Mrs. X, was thirty-five years old, with negative family and past history. She had undergone two pregnancies, normal except for the fact that her first resulted in a premature delivery at six or seven months, exact time not to be determined. However, the baby was raised in an incubator with little difficulty, and developed into a normal child of average good health. The two former children are now fifteen and eight years old respectively. There was no history of miscarriages nor symptoms pointing to any pelvic condition. The menstrual history was negative. Her periods had always been regular and were never marked by menorrhagia, dysemenorrhea, metrorrhagia, other abnormality. There was no history of vaginal discharge. Neisser infection and syphilis were denied and there was no evidence pointing to either.

I was first called in consultation to see Mrs. X in May, 1922. At that time she had skipped her last two menstrual periods, and complained of severe pain in the pelvic region with moderate hemorrhage from the vagina. This discharge did not have the characteristics of normal menstrual flow. It was redder in color and showed a tendency to clot. Her general condition was fair. A mass was made out on the right side of the pelvis, about 5 to 6 cm. in size, not attached to the uterus, exquisitely tender on palpation. Vaginal examination elicited extreme pain in the right fornix. At that time, I made a diagnosis of a mass in the right uterine tube, probably a tubal pregnancy, and the patient was impressed with the importance of prompt operative interference. Before consent to operation could be obtained, a matter of about thirty-six hours, the pain and hemorrhage both subsided rapidly. From this time until some months later, I lost sight of the patient but was told, from time to time, that she was going through what seemed to be a normal pregnancy.

On January 18, 1923, seven and a half months later, I was again called in consultation at 11 P.M. By the time I arrived, the woman had been in what appeared

to be normal labor for eight hours. She was having severe bearing down pains every four minutes. Examination showed a head low in the pelvis but the cervix could not be located by palpation. To facilitate a more complete examination, a little chloroform was administered. The cervix was then found high up in the vagina, very soft, the external os tightly closed, and so drawn posteriorly and upward, and flattened out to such a degree that it was difficult to distinguish from the vaginal wall. The uterus was felt to be slightly larger than normal, lying in the bottom of the pelvis, rendering it difficult to make out. A diagnosis of abdominal pregnancy was made and the patient rushed to the Waterbury Hospital.

The patient was etherized, and the abdomen opened by a median incision extending from the umbilicus nearly to the symphysis. A baby girl weighing seven pounds was delivered. The child appeared normal in size and development, respiration was established immediately and spontaneously, and no defect whatever could be found.

The placenta was adherent to the right tube, greater omentum, the mesentery throughout most of its length from the ileocecal valve upward, appendix, cecum and pelvic peritoneum. I found that by resecting part of the omentum and the right tube, a large part of the placenta could be delivered through the wound. This was done, an appendectomy performed, and the placenta freed from the cecum. Further placental separation was not considered advisable at this time, about three-fourths of the placenta delivered through the abdominal wound and the wound closed tightly about it. As there was slight bleeding from the placenta, it was tied as far down as possible with sterile tape. A dry dressing was applied. The right tube, removed at operation showed evidence of rupture, confirming the original diagnosis of a tubal pregnancy that had ruptured and continued to term as an abdominal pregnancy. Lactation was established in three days and was normal.

Three weeks after delivery, the remainder of the placenta had separated, was withdrawn from the wound, and the wound closed by sutures. During this period, the course of the mother was uneventful, and she showed rapid recovery and gain in strength after the operation. The child was at no time other than a normal newborn infant. Both were discharged from the hospital in perfect health six weeks after delivery. The last three weeks of their stay was for observation only. They could both have left at least two weeks sooner, if their discharge had been governed by symptoms.

175 Columbia Boulevard.

CHRONIC ULCER OF VAGINA OF UNDETERMINED ORIGIN

By Isidor Kross, M.D., New York

Adjunct Gynecologist, Mt. Sinai Hospital.

THE patient is a well nourished woman 34 years old and was first seen December 31, 1921, in the out-patient department of the Gynecologic service of Mt. Sinai Hospital (Dr. Jos. Brettauer, Director). Her history for past illnesses is a negative one. Her menstrual history is quite normal. She was married at the age of 17 and has conceived 6 times. Her first child is alive and well. The second died when three months old. The third was a full term stillbirth. The last three conceptions resulted in spontaneous abortions. Her husband died of insanity in his forty-fourth year. For some time prior to his death, he was treated for a blood disease. The present illness dates back four and a half years and began with frequent and painful urination. At times, there would occur retention of urine necessitating catheterization.

Except for the local condition, no abnormalities of any kind were found. On the distal portion of the anterior vaginal wall, beginning just below the clitoris, there is seen an ulcer which is approximately one and a half inches in diameter. In the central part of this lesion, the opening of the urethra can be made out. The edges of the ulcer are sharply punched out, slightly undermined and not infiltrated. The base is composed of sluggish, flabby hemispherical masses of granulation tissue varying in size from one-sixteenth to one-quarter inches in diameter. In appearance, these granuloma masses are of marked pallor. A thin layer of grayish mucopurulent secretion covers the base of the ulcer. Palpation is painless and does not cause any bleeding. Neither is the tissue friable. The inguinal glands are not enlarged nor are they painful.

In attempting to reach a diagnosis, the following conditions were considered: (1) Ulcerating malignant growth. (2) Ulcerating gumma. (3) Tuberculous ulcer. (4) Tropical ulcer, the latter in spite of the fact that the patient is a native of Russia and has never been in the tropics.

The Wassermann blood test was negative.

A provocative Wassermann test was also negative.

Smears from the secretion and smears from the superficial curettings of the base of the ulcer revealed no pathogenic organisms, search being especially made for the tubercle bacillus.

Numerous urine examinations always showed many pus cells, but never any tubercle bacilli.

Special search was made on two separate occasions from the secretions and from the superficial curettings of the base of the ulcer for Donovan bodies or the bacillus mucosus capsulatus of Friedlaender as described by Walker. These organisms are pathognomonic for *granuloma pudendi*. These tests also were negative.

A specimen of tissue removed from the edge of the ulcer was examined histologically and showed an intense inflammation of the sub-

epithelial tissue. There was no evidence of malignancy, tuberculosis or syphilis.

In spite of all these negative findings, it was decided to administer a course of antisyphilitic treatment as a therapeutic test, especially in view of her husband's history of insanity and of her own repeated abortions. On March 30, 1922, after the patient had received four intravenous injections of salvarsan, she was again examined. It was now noted for the first time that epithelialization had begun. A distinct tongue of epithelium could be seen growing toward the center of the ulcer from the upper left margin. The granulation tissue appeared much healthier and was distinctly red in color. This is especially remarkable in view of the fact that all previous treatment—fulguration with the electric cautery, applications of silver nitrate, douches, etc.—had been without any effect.

In view of the history, clinical course of the disease, negative diagnostic tests, and especially in view of the result of the therapeutic test, the writer feels that he is justified in regarding this lesion as a syphilitic one of low grade virulence.

20 WEST FIFTIETH STREET.

REPORT OF CASE OF ANENCEPHALY—DIAGNOSIS BEFORE ONSET OF LABOR

BY ALEXANDER M. CAMPBELL, M.D., F.A.C.S., AND PAUL W. WILLITS, M.D., GRAND RAPIDS, MICHIGAN

THE following report of an anencephalic monster in which the diagnosis was made of the condition before the onset of labor, is presented, not because of the pathology, but because it demonstrates the value of roentgenography in obstetrical diagnosis. The proper emphasis has not been given to the use of the x-ray in the obstetrical field. With the improved technic and apparatus at the present time the x-ray examination of the gravid woman, and especially the primipara, should become a part of a good obstetrical service.

Mrs. H., age twenty-four, primipara, presented herself for examination on July 8, 1922. Her condition throughout the pregnancy had been normal and she had not felt it necessary to consult a physician. She had been married for two and one-half years, but had never been pregnant. She had a dilatation and curettage twice, partly on account of sterility and partly because of dysmenorrhea.

Family history, negative; personal history, negative except for typhoid fever at 8 years of age; blood Wassermann, negative. Last menses occurred November 12, 1921. Life was felt at about four and one-half months and the probable date of confinement was set for August 19, 1922.

General physical examination.—Patient was an athletic type of woman apparently eight months pregnant. The abdomen was rather firm although not overly large. Pelvic measurements: Intersp. 24; Interer. 27; Intertroch. 30; External Conj.

21; Internal conj. was not determined as the patient appeared to have normal measurements, and was in her eighth month. Blood pressure: systolic 110, diastolic 70; weight 121, urine negative.

She was examined carefully every two weeks from the date of her first consultation. She increased normally in weight, her blood pressure remained normal, and the urine was negative throughout. She failed to go into labor on the expected time, but the possibility of a mistaken date was considered and no alarm was felt.

On September 5th, 17 days after estimated time of confinement rectal examination showed a partially effaced cervix, but no pains had been felt. After a careful aseptic preparation she was examined vaginally. The cervix was found to be partly effaced and she was dilated sufficiently to introduce a finger into the cervix. A soft mass was felt at the end of the examining finger with rather a hard oval rim about a softer center. An abdominal examination showed the ovoid to be longitudinal. Fetal heart tones were good on the right side below the level of the umbilicus. Small parts were to the left and well up, and what was thought to be the buttocks palpated in the upper right quadrant. The probability of a monstrosity was strongly suspected, and the patient taken to the hospital for an x-ray examination. This showed a fetal skeleton with the small parts in the upper half of the uterus, and with the vertebral column and ribs well down in the pelvis. Hydrocephalus and the presence of a normal head were excluded, and a positive diagnosis of anencephalus was made.

The patient was advised to have the pregnancy terminated at once. After 24 hours this advice was accepted, and a Vorhees bag was inserted under anesthesia at 10:15 A.M. Patient was returned to her bed and slight traction, 2 pounds, made on the bag. The patient was given morphine gr. ¼ at 10:15, and again at 12:15, and felt very little pain at any time during the procedure. The bag was expelled at 1:25 P.M. and a version and extraction performed at once. A living anencephalic monster was delivered. No attempt was made at resuscitation but the child lived for about four hours. There was a hydramniotic condition present. Convalescence was uneventful.

J. T. Case of Battle Creek was the first to report a roentgenographic diagnosis of an anencephalic monster, in 1917, and as far as we have been able to ascertain ours is the second case that has been reported in medical literature. It is our opinion that roentgenography, especially where any abnormality is suspected, will become a common procedure in obstetrical diagnosis.

Credit for the diagnosis in this case should be given largely to Dr. Thomas O. Menees, roentgenologist, Blodgett Memorial Hospital.

REFERENCE

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METZ BUILDING.

REPORT OF A CASE OF ADENOCARCINOMA OF THE BODY OF THE UTERUS

By J. S. Horsley, Jr., M.D., Richmond, Va.

(From the Surgical Department of St. Elizabeth's Hospital.)

THE following is a report of an early case of adenocarcinoma of the body of the uterus which probably developed on an hypertrophic endometritis, and which was apparently cured by curetting and radium application.

Mrs. F. V. S., white, aged 47, housewife, complained of "bleeding from the

Fig. 1.—Photomicrograph of adenocarcinoma of body of uterus, showing a low degree of malignancy, Grade I (according to Mahle's grading). × 200 (approx.).

womb." She had seven children, living and well, and one dead, cause unknown. Past history was negative, except for influenza in 1918 and long standing constipation. Since the birth of her last child, fifteen years ago, she had had a slight protrusion of the bladder for which she had worn a pessary for twelve years. This condition had become worse. When the bladder was full, the protrusion was about the size of a "hen's egg." It subsided after urination. For the past twelve years she had had a tired, dragging sensation in the small of her back after exercise. There was no pain on defecation.

The patient's last menstrual period was five years ago. Since then she has had a moderate whitish vaginal discharge. Three weeks ago, she had noticed a slight burning sensation in the left side of the abdomen. This was soon followed by bleeding (about a tablespoonful) from the vagina. She subsequently bled small amounts on two successive days.

The patient was a very obese women with bad teeth, numerous varicosities of

the right ankle and both thighs, blood pressure 180/90. The abdomen was slightly tender on deep palpation over the umbilicus and lower part. Pelvic examination showed marked cystocele and rectocele, markedly enlarged and congested cervix. Physical examination was otherwise essentially negative.

The patient refused to have a hysterectomy, and on July 27, 1920, dilatation and curettage were done, the cervix was amputated, and the cystocele and rectocele were repaired. The uterine scrapings showed hypertrophic endometritis with no evidence of malignancy. The patient left the hospital after twenty-three days of normal convalescence.

Further slight vaginal bleeding caused her to return, and on October 29, 1920, she was again dilated and curetted. Uterine scrapings showed both on immediate frozen section and on celloidin block a hypertrophic endometritis. On February 14, 1921 dilatation and curettage were done again for further bleeding. The uterine scrapings appeared somewhat unusual and showed a low grade adenocarcinoma (cor-

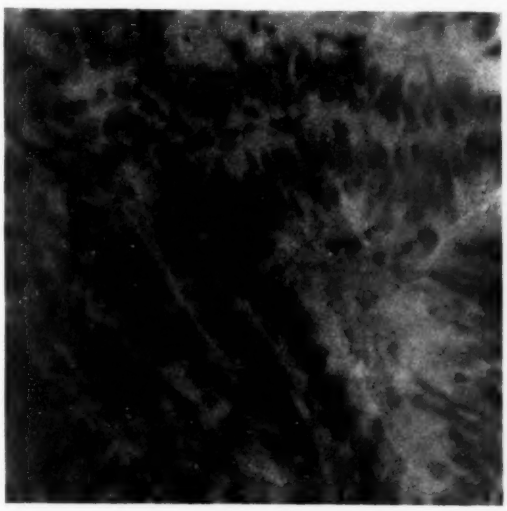

Fig. 2.—Photomicrograph of adenocarcinoma of body of uterus of same area as Fig. 1. × 500 (approx.).

responding to Grade I. according to Mahle's differentiation of this type of malignancy) by microscopic examination (Figs. 1 and 2). Twenty-five milligrams of radium were inserted into the body of the uterus for twenty-four hours. Again on May 18, 1921, dilatation and curettage were performed, followed by the application of 57 milligrams of radium for twenty-four hours. Uterine scrapings were small in amount and not malignant, either grossly or by microscopic examination of frozen fresh and celloidin sections. On January 18, 1922, dilatation and curettage were done, and 50 milligrams of radium inserted into the uterus for twenty-four hours. The curetted material was again small in amount and showed no evidences of malignancy either grossly or microscopically. Soon after her last examination she left town, and has not been heard from since.

This case is unusual in that there apparently developed, rather suddenly, on a previously benign condition an adenocarcinoma of the body of the uterus, which seems to have been cured by dilatation and curettage operations, and the insertion of radium.

New Instruments

A VIRGIN BIVALVE SPECULUM (ADULT LENGTH)*

By Victor Cox Pedersen, A.M., M.D., New York

In my clinic in urology at St. Mark's Hospital, there are a great many adult virgins who are supposed, or are known, to have had illicit sexual intercourse with the danger of venereal disease infection and the possibility of impregnation. Such patients are referred to me by courts, reclamation associations, churches, social agencies, individual workers and the like. It becomes essential to know

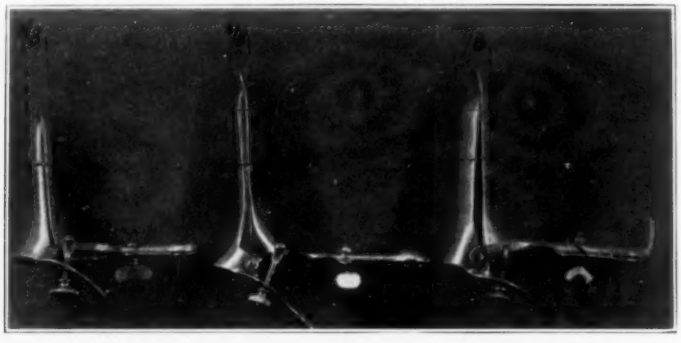

Fig. 1.—Shows the specula from the side with the identity of thickness of the two virgin instruments, which is less than one-half the thickness of the parous type.

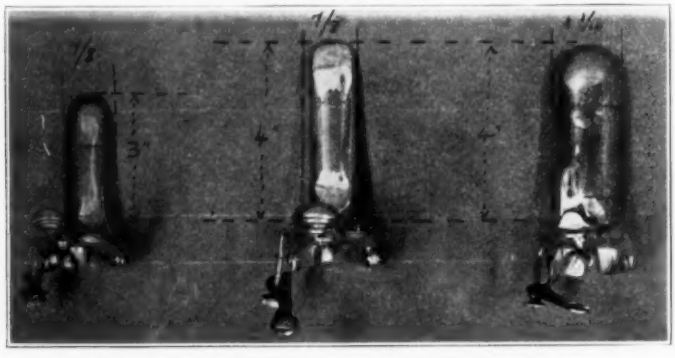

Fig. 2.—Showing lengths of blades identical in the parous and the author's virgin type, but one inch longer than the standard virgin type; also indicating the widths of blades identical in the two virgin types, and a half inch narrower than the parous type.

whether or not these young women are infected, after the equally important detail of complete or incomplete intercourse has been settled.

It is worth while to repeat a few details regarding the taking of specimens for venereal disease, especially gonococcal and allied infections in women. A recent

*Presented before the Section on Obstetrics and Gynecology of the New York Academy of Medicine, December, 1922, and before the Annual Meeting of the American Electrotherapeutic Association, September, 1923.

experience is worth quoting. The report of a certain large clinic made the unusual announcement that only four per cent of the women applying, off the streets, for a veneral disease diagnosis were found to be infected. When I questioned the head of this clinic, and when he in turn interviewed the staff, it was found that only one smear slide was taken in a haphazard manner, not infrequently by a nurse and not by a physician. I then informed him that if he would institute the plan of taking at least four original specimens and four control specimens, in pairs, each pair from the urethra, vulva, vagina, and cervix, he would at least cover the usual sites of infection adequately. Furthermore, these specimens should be taken with considerable pressure or massage action on the mucosa in order to squeeze out the contents of glands which may carry infection. Slight contact of the swab on the surface of the secretion is by no means sufficient. This principle is well known among throat specialists in dealing with the tonsils. The only difference is that the crypts of the tonsils are recognizable to the naked eye, whereas the crypts of the mucosa in the sexual organs are usually not perceptible. Finally the varieties of organism found in the sexual passages and organs of the female are so great that only a culture will decide between the important or pathogenic, and the unimportant or nonpathogenic. On the basis of these tried and axiomatic principles, it becomes necessary to reach the culdesac of the vagina and the cervix in any woman presented for diagnosis.

After struggling for several years with the so-called standard virgin speculum I determined that a long instrument, with all the other dimensions about the same, was essential, and I, therefore, devised the speculum shown in Figs. 1 and 2, where it may be compared with the standard specula for virgins and parous women.

The advantages of the instrument are immediately apparent. There is but one limitation of simple character—namely, in some young women, especially if the bladder and rectum are full, the lateral walls of the vagina crowd into the opening of the instrument on account of its narrow blades as well as their own obstructing condition. In such instances, in order to reach the culdesac of the vagina and cervix, a small spatula or similar instrument is necessary to push back one lateral wall so that proper access may be obtained.

45 West Ninth Street.

Department of Reviews and Abstracts

Conducted by Hugo Ehrenfest, M.D., Associate Editor

Collective Review

THE APPLICATION OF X-RAYS TO OBSTETRICS AND GYNECOLOGY

By Ramsay Spillman, M.D., New York City

THE recent general recognition that the x-ray is of value in the diagnosis of pregnancy, in the determination of presentation and of fetal abnormality, etc., has been accompanied by a lively interest in the possible effect of the x-ray on the fetus, in view of the general appreciation of the lethal effect of the rays on embryonic tissue. That the x-ray is reliable in obstetric diagnosis has been shown by Stein and Arens,[1] who, within a year of coming to recognize that the fetal skeleton is demonstrable, announced a series of more than 400 cases studied. They have not been able to demonstrate the fetal skeleton with regularity before the fifth month, but in the last trimester of pregnancy it is regularly seen.

However, when Bailey, a man of recognized standing in the fields of obstetrics and the gynecologic application of radium, takes a stand against the use of the x-ray in obstetric diagnosis,[2] it should give one pause before rushing into the new field. Other practitioners, discussing the paper of Bailey and Bagg, stated that their patients in various stages of pregnancy had undergone roentgenologic examinations of the urinary tract, etc., without any injury to the developing fetus. A tangible basis for great caution in the exposure of the pregnant woman to either the x-ray or radium is found in the work of Bagg,[3] who injected pregnant rats with a saline solution containing relatively large doses of radium emanation and found that this treatment even late in pregnancy resulted in the birth of dead or blind young. Subsequent examination of the surviving young showed extensive defects in the central nervous system, of which the defect in the eye was but a reflection. In a personal communication, Edling, a Swedish roentgenologist who has examined more than 200 patients in the past six years in one clinic, states that the children of the women he examined at the beginning of the series have shown no abnormality. Imboden has stated to the writer that he regards a proper roentgenologic examination of the pregnant woman as entirely free from harm for the child, but he takes issue most emphatically with operators who subject such a patient to a dozen exposures.

Pneumoperitoneum does not figure extensively in American roent-

genologic literature of the year. Von Teubern[4] reports on the examination of 93 patients by this means, with the following results:

I. Persistent abdominal pain of hitherto unexplained origin, 23 cases:
   Peritoneal adhesions, 5 cases.
   Small hard liver, hydrops of gall-bladder, 1 case.
   Tumor-like shadows in right hypogastrium, 7 cases.
   (All diagnosed as chronic adhesive perityphilitis and in the 5 patients operated on, diagnosis confirmed.)
   Movable kidney, 2 cases.
   No findings, 8 cases. Several of these patients had no more pain after the procedure and were discharged as cured.
II. Chronic icterus, gall-stone colic.
III. Gall-bladder and liver tumors.
IV. Abdominal tumors.
V. Hepatic lues, 5 cases.
VI. Liver abscess, 5 cases.
VII. Tuberculosis of the peritoneum, 2 cases.
VIII. Relaxation of the diaphragm, 2 cases.

A death after pneumoperitoneum has been reported by Joseph.[5] The autopsy findings were not equivocal, but it is believed that the cause of the fatality was air embolus from the puncture of the iliac vein, which was displaced from its normal relations by a deformity of the vertebrae and sacrum.

Basic ideas on x-ray treatment are being revised. Until recently it has been believed that scattering of the radiation in the tissues produces a considerable diffusion of the margin of the cone of x-rays, and dosage has been estimated according to the isodosage curves of Dessauer and Vierheller. At the Congress of the German Roentgen Society[6] in Munich in April, Holfelder created the most lively interest by his assertion that the scattering of the radiation at the periphery of the cone of rays is negligible. A commission was appointed to investigate the discrepancy between Holfelder's findings and those which he challenged.

It is coming to be the custom to measure x-rays in Angstrom units of wave length. This measurement is attained by the use of an x-ray spectroscope: a crystal is composed of molecules arranged in planes separated by distances of the order of the wave length of the x-rays. These planes reflect the x-rays and form an invisible spectrum, in which the different wave lengths are detected by the use of an ionization chamber. This is a box filled with a gas of which the electrical conductivity is increased by ionization of the gas by the x-ray of the particular wave length that is reflected by the crystal at a given angle to the long axis of the chamber. It was the feeling at the German congress that the lack of uniformity of results in x-ray treatment is due to a number of factors, of which one has been the lack of uniformity of x-ray itself. Küstner spoke at the congress of the need for a standard model of ionization chamber for the measurement of roentgen rays, simple enough to operate and inexpensive enough that every roentgen treatment can be standardized by a uniform instrument. When this is accomplished, one of the variables in the very

complex equation of roentgen treatment will be replaced by a constant, which will be a great aid in determining the variables that remain.

The biology of the effect of x-rays upon tumors is a problem that is receiving earnest attention. Schwarz[7] calls attention to a new conception of facts that have long been known, namely, that normal benign growing tissue shows towards repeated x-radiation a uniform or increased sensitiveness, while malignant recurrent anaplastic blastomas exhibit a decreasing sensitiveness to the influence of x-radiation. This he believes is due to the irradiation killing off the more susceptible malignant cells, leaving as survivors the more resistant ones; successive treatments leaving only the most hardy cells, which bring about the patient's death. Hence the conception that radiation stimulates malignant growth. Yet this is not accepted generally as an indication that a patient should be subjected to a tremendous initial dose; the x-ray in treatment of cancer is still regarded by many as a palliative rather than a curative measure, and one should aim to ease the existence of the patient rather than to subject him to roentgen-sickness in a vain hope of killing the whole cancer at one sitting.

Opitz[8] at the 1922 meeting of the German Gynecologic Society stated that Professor Kolle had furnished him with a mouse carcinoma which gave 100 per cent of takes in inoculations with a suspension of the cells or with bits of tissue. Irradiation of mice after the establishment of this tumor was followed by definite regression of the tumor in comparison with controls. However, *irradiation of the broth containing the inoculation-material with a dose ten times the treatment dose used for cancer of the human uterus did not diminish in the slightest the percentage of takes.* But when either the whole mouse, or the skin over the prospective site of inoculation, was irradiated within three days previous to the inoculation, the percentage of takes was much decreased. Therefore, cancer cells that die as the result of irradiation, do not die because of the lethal effect of the ray directly on the cell, but because the ray produces, as a catabolism product of the somatic cells, some substance that combines with the cancer cells and deteriorates them. My query would be: shall we look forward to seeing the tumor region screened from the rays and the rest of the body irradiated?

X-ray application appears to be firmly established as the treatment of election for selected cases of uterine fibroids, the principal contraindications being sloughing or frankly submucous myomas. Zacherl[9] spoke on the results of irradiation of 266 cases of myoma in the women's clinic at Graz. Of the whole number, 245 patients remained under observation until treatment was considered completed. In 139 cases two or three treatments were given. In all cases the tumors were noticeably diminished, and in half the cases the tumors almost entirely disappeared. Among the latter were a number of cases of resumption of regular menstruation after a long period of amenorrhea. In this clinic the roentgen treatment of metropathy has been similarly successful.

Yet in the same journal we read that direct radiation of the fibroid in several cases was observed by Hofbauer[10] to be of no effect, but by a conception that is, to say the least, daring, a radiation of the

hypophysis from each side with 30 per cent of the erythema dose was followed by complete regression of the tumors and the bleeding, without any manifestations of pituitary damage. So far he has not repeated the radiation, and states that if there were occasion to repeat it, that three months should elapse between treatments.

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Selected Abstracts

Complications of Labor and Their Prevention

Anderson, J. W.: High Percentage of Abnormal Obstetric Cases in General Practice. The British Medical Journal, July 22, 1922, p. 126.

The author reports that within six months, out of 42 obstetric cases attended, 19 or 45.2 per cent presented some definite abnormality. Only one of these cases was seen in consultation with a midwife. About 60 per cent were primiparae. In 46.7 per cent there was definite evidence of toxemia. F. L. ADAIR

Kuhlmann: One Thousand Cases of Obstetrics as Seen by a Country Practitioner. The Journal-Lancet, 1923, xliii, 146.

The author reports one thousand confinements with a maternal mortality of 0.33 per cent. Forceps were used but four times in the series. Placenta previa occurred three times and eclampsia twice. One woman died of a ruptured uterus following the injection of one ampule of pitruitrin in the first stage of labor. Another patient died two hours after the administration of chloroform for the removal of a retained placenta. Four patients developed breast abscess. The writer concludes that a clean conscience, patience and good judgment are the essentials of successful obstetric practice. H. W. SHUTTER.

Couch: Fashionable Midwifery. The Medical Journal of Australia, 1922, xi, 264.

The author denounces emphatically the routine use of version and extraction, or low forceps in all cases. He emphasizes the danger of unnecessary interference, and is a firm advocate of conservative obstetrics. The value of such procedure is well shown in the following group of cases. In 580 labors forceps were used on eight occasions. Of this group there were 14 persistent occipitoposterior presentations, and two face presentations. There were nine twins, eight cases of eclampsia, and 18 breech presentations. Only two cesarean sections were performed. There were no cases of sepsis and no deaths from any cause. In six years he observed only five cases of sepsis with one death, and 91 stillbirths, including 26 macerated fetuses in a total of 2500 cases. NORMAN F. MILLER.

Van Blomestein: Rectal Examination During Labor. Nederlandsch Tijdschrift voor Geneeskunde, 1923, i, 259.

The author believes that the morbidity and mortality of the parturient woman would be reduced quite considerably if rectal examination were practiced universally. In support of this view, he cites various statistics. In the Amsterdam women's clinic the death rate from puerperal sepsis over a period of ten years averaged 1.6 per cent. For the entire city the figures are slightly higher, the difference being not as great as one would expect. In the clinic at Utrecht, 29 per cent of the parturient women had temperature over 38°. These rather unfavorable conditions are attributed by van Blomestein to the fact that rectal examination is not in general use in Holland. He believes that vaginal examination is responsible both for the milder as well as the severer infections. In contrast, he presents figures from some of the German clinics. Typical of these are the figures from Chrobak's clinic in Vienna, reported by Bukura, which show among 2155 women delivered without examination, no mortality from puerpural sepsis. Of 8631 patients examined only in the clinic, and who were delivered spontaneously, 0.07 per cent died from infection, while of 1843 spontaneously delivered women who had been examined before entering the clinic, 0.43 per cent succumbed to puerpural sepsis.

R. E. WOBUS.

Fürst, W.: The Value of Rectal Examinations during Labor and Their Limitations Compared to the Usual Vaginal Examinations. Zeitschrift für Geburtshilfe und Gynäkologie, 1923, lxxxv, 469.

The author quotes extensive statistics from various clinics indicating that the morbidity in labor cases conducted entirely by rectal and external examinations is considerably lower than in those where vaginal examinations are employed. Normal labors may be satisfactorily conducted without the latter, and even in pathologic labor, rectal examination may give almost as much information as the ordinary vaginal examination with two fingers. Where there is dystocia due to disproportion between head and birth canal, vaginal examination with the whole hand is required to determine the exact relationship and the possibility of spontaneous birth. All cases where bloody urine, edema of the cervix or a contraction ring rising to the umbilicus indicate serious danger to the mother definitely require a vaginal examination. All cases of hemorrhage during labor require vaginal investigation. Prolapse of the cord or of a small part can usually be diagnosed rectally, yet in case of doubt, and in fact in any case where the rectal findings are not clear, vaginal examination should be undertaken. Operative vaginal manipulation should always be preceded by a careful vaginal examination. Limitation of vaginal examination should be more strict under all conditions where careful asepsis cannot be maintained. Vaginal examination, douches, intercourse and tub baths should be avoided during the last eight weeks of pregnancy. Rectal examination should be avoided whenever there is a urethral gonorrhea. Such a case should be conducted entirely by external examination if this be at all possible; if not, then vaginal examination should be used. Any disease of the rectum forms also a contraindication to rectal examination.

MARGARET SCHULZE.

Labhardt, Alfred: On the Question of Rectal Examination in Obstetrics. Schweizerische Medizinische Wochenschrift, 1922, lii, 193.

This article includes the usual discussion of the dangers of repeated or even one vaginal examination. Approximately three thousand cases are reported which had either no examination, rectal examination, one vaginal, or two vaginal examinations.

The small percentage of febrile elevation of temperature when rectal examinations only were employed is at once apparent. He concludes that the rectal examination can be done with little or no manipulation, that it is less disturbing, that it carries less danger of infection, that it affords all the information necessary and that vaginal may only be necessary to check up the findings at rare intervals. To be successful, however, vaginal examinations must have been done first thoroughly to become acquainted with the anatomic conditions. A. C. WILLIAMSON.

Kupferberg: Conduct of Labor Without Vaginal Examinations. Medizinische Klinik, 1922, xviii, 617.

It is a sad fact that during the past five years the number of cases of puerperal sepsis has doubled. This is due to many causes, among them, an increase in general septic diseases, uncleanliness, increase in venereal disease and in abortions, especially criminal abortions, unindicated forceps operations and manual removal of the placenta. As an aid in the prevention of sepsis, it is advisable that the physician make a thorough examination of the patient two or three weeks before term. This should include measurements of the pelvis and abdominal and vaginal investigation.

During labor, of greatest importance is the employment of the four maneuvers of Leopold-Zweifel-Schultze. The first indicates the height of the uterus and the part occupying the fundus; the second determines the direction of the long axis of the child and the side on which the back lies; the third seeks for the part occupying the inlet; and the fourth maneuver determines the extent of engagement of the presenting part. Auscultation will inform the physician of any impending danger to the child. Frequent use of the third and fourth maneuvers will show the progress of descent of the presenting part. When a breech presentation is suspected, the discharge of meconium will strengthen the suspicion. Of importance in the conduct of labor are the character and position of the pains. In the first stage the pains begin in the middle of the abdomen or the back and gradually are felt lower and lower. When there is complete dilatation the pains are strongest over the symphysis and over the coccyx. In the period of expulsion the pains are of a bearing-down character. By means of all these observations the great majority of labors can be conducted accurately without danger to mother or child. Should an internal investigation be necessary, a rectal examination should be made.

Without vaginal examinations one may not only determine whether the child is alive or dead, its size, presentation and position, amount of liquor amnii, parietal presentation and multiparity, but also, with the aid of rectal examinations, one may recognize placenta previa, abruptio placentae, prolapse of the cord and tearing of vasa previa in cases of velamentous insertion of the cord. Postpartum, it is possible to diagnose an inversion of the uterus from external examination alone, and the differential diagnosis of postpartum hemorrhage can be made by the same means.
J. P. GREENHILL.

Wijsenbeek: Is Early Rupture of the Membrane Desirable? Nederlandsch Tijdschrift voor Verlooskunde en Gynaecologie, 1922, xxviii, 34.

After a systematic study of 4382 labors, 2643 of which were in primiparae and 1739 in multiparae, Wijsenbeek arrives at the following conclusions: In general, the time of rupture of the membranes has no effect upon the time required for dilatation of the cervix. In a given case it is impossible to say how the uterus will react to the loss of the amniotic fluid. When the membranes rupture early, more cases of retarded expulsion will occur. Forceps application will be necessary three times more often in cases of early rupture. Prolapse of the cord is not more

common in cases where the membranes persist until full dilatation is accomplished. In early rupture of the membranes, fever during labor is much more frequent. Early rupture of the membranes is not a contributing cause of deep cervical tears. In dry labors, both fetal and maternal mortality is higher. R. E. WOBUS.

Willmore: Clinical Observation on Adhesion and Retention of the Membranes. Indian Medical Gazette, 1922, lvii, 210.

The author discusses 96 labor cases, personally attended, in which this complication has been found. Retention of the placenta occurred once, whereas definite trouble with the membranes occurred in twenty of the cases.

The first notable fact observed was the markedly varied course taken by these cases. It seems possible that reported deaths from sepsis following labor, where there has been no interference, are due to unrecognized cases of this complication. The involution of the uterus appears to be much less influenced by the retention of membrane. A third feature is the frequency of hemorrhage. Adhesion of the membranes is by far the most frequent cause of postpartum hemorrhage. Its occurrence early in the third stage points to trouble with the membranes. Finally, apart from the pyrexia, the relatively mild effect on the patient, a slight degree of headache was constant.

As prophylaxis, the third stage should not be hastened or interfered with. If after delivery of the placenta some of the membranes are retained, the case should be left to nature. On appearance of reaction, intrauterine douches are given daily, preceded by a vaginal douche. The aim of the douche is not one of disinfection, but is purely the mechanical one of cleansing the uterus from discharge and washing away loosened membrane. F. J. SOUBA.

Vermelin: Dissociation of the Membranes. Le Progrès Médical, June 11, 1921, p. 277.

In reviewing the literature Vermelin finds that as early as 1892, separate rupture of the amnion and chorion was described by Ribemont and Dessaignes, and later by Pinard and Varnier.

This dissociation may vary from only a slight separation around the area of rupture to that of complete separation. Dissociation occurs in those cases where seemingly labor is made safer for both the mother and the child by their separation. In the main, these pathologic conditions are low implantation of the placenta, retarded rupture of the membranes, adherent membranes and abortions.

In the case of low implantation of the placenta the chorion ruptures prematurely. The amnion then becomes separated and slides downward over the chorion with each uterine contraction. In this way pressure is diverted from the placenta which remains attached throughout to the uterine wall so that the hemorrhage which would follow its detachment is averted.

A similar occurrence takes place in cases of retarded rupture of the membranes so that the placenta remains in contact with the uterus, the fetal circulation continues unharmed and asphyxiation of the child is thus avoided.

In the case of adherent membranes a premature rupture must necessarily take place before cervical dilatation can be accomplished. Here again the chorion alone ruptures and the amnion, by virtue of its property of greater elasticity, serves both as a dilating wedge for the cervix and as a barrier to the entrance of infection into the uterus from below.

Finally, in abortion much hemorrhage is averted by a dissociation of the membranes because the fetus and amnion, the cord having become separated from its

placental attachment, may be expelled while the chorion and placenta remain attached throughout to the uterine wall.

The diagnosis of dissociation of the membranes may be made either when there has been an expulsion of a clear fluid, but subsequent vaginal examination reveals a contiguous sack of waters in front of the presenting part, or when a thin paper-like membrane may be seen presenting at the vulva. The importance of its recognition and diagnosis lies in the fact that it is one of the greatest etiologic factors in partial retention of the membranes. Vermelin reports twenty-three cases of retained membranes of which ten showed complete and thirteen showed partial dissociation of the amnion and chorion. THEODORE W. ADAMS.

Zarate, Enrique: The Necessity of Uniformity in the Nomenclature of Uterine Dystocia. Gynécologie et Obstétrique, 1922, vi, 1.

The author concludes that the only dystocia which should actually be accepted as a pathologic condition leading to uterine dystocia is that of uterine stricture or "dystocie annulaire." Attention should be paid to the dystocia of Scanzoni or the uterine retraction or pseudocontraction, to see if it presents especial characteristics. The chapter on uterine dystocia should be subjected to careful, detailed and impartial study. The young specialists should carefully study and work out this problem, because those who are older cannot as readily liberate their ideas from older teachings and traditions regarding uterine dystocia. F. L. ADAIR.

Lange-Nielsen: Clinical Observations on the Contraction Ring in the First Stage of Labor. Acta Gynecologica Scandinavica, 1922, i, 295.

A systematic attempt was made to feel the contraction ring in all patients during the first stage of labor and in 67 cases out of 1564, the ring was felt. Of these 60 were primiparae. There was a mechanical disproportion in 15 of these 67 women, and in 11 cases the ring rose higher during the second stage. In almost half of the cases, the ring rose as high as the umbilicus and in most of the remainder, it reached midway between the symphysis and the navel. The dilatation of the lower uterine segment was not very great and during the intervals between pains there was neither tenderness nor spontaneous pain. There was no constant relationship between the height of the ring and the amount of cervical dilatation, as Unterberger maintained. In most of the cases there were normal occiput presentations. Early rupture of the membranes was a very common occurrence in this series. In many cases the ring had no significance as the patients had easy spontaneous deliveries. In general, however, a rising contraction ring means that the first stage is not progressing normally and labor should be terminated if progress is slow. Even in the severe cases the signs were not those of threatened rupture of the uterus. The contraction ring appears to be a functional anomaly and among the possible causes may be mentioned early rupture of the membranes, slightly contracted pelvis, elderly primiparity and defects in the uterine musculature or its innervation. J. P. GREENHILL.

Greenhill: Dystocia Due to Constriction of One Thigh by Cervix in a Cephalic Presentation. Journal American Medical Association, 1922, lxxviii, 98.

Greenhill reports a rather unique case. A female child was spontaneously delivered until the umbilicus presented at the vulva, when further delivery was impossible. It was found that the left leg was in the vagina, while the right was tightly clamped by the cervix. Even after complete surgical anesthesia, it was difficult to release the grasp of the cervix by inserting a finger. The baby showed

a deep constriction encircling the upper third of the thigh, below which the leg was very much enlarged due to blood stasis. R. E. WOBUS.

Sachs, E.: The Treatment of Weak Uterine Pains. Medizinische Klinik, 1922, xviii, 1045.

In treating weak uterine pains it is essential to know the stage of labor, and whether the atony is primary or secondary. Among the causes of uterine atony are congenital weakness, overdistention, fever, premature use of twilight sleep, complications of labor and sudden emptying of the uterus. The danger of atony increases with the progress of labor. The most dangerous period is after the expulsion of the placenta, but fortunately there are means of overcoming this atony.

Uterine weakness during the first stage requires no special treatment. If secondary atony arises in the first stage, a large dose of morphine is indicated.

The older means of stimulating pains are mechanical; but they do not equal quinine, chineonal or hypophyseal extract. In over 700 cases treated with pituitary preparations no bad result occurred. These preparations give better results in cases of secondary atony which usually require treatment in the second stage. In the third stage before the expulsion of the placenta, pituglandol in primiparae gave good results, but in multiparae failures occurred due to adherence of the placenta. After expulsion of the placenta, pituglandol gave perfect results. During the past 12 years, Sachs has not found it necessary to pack the uterus for atony because pituglandol, given intravenously, absolutely controls uterine atony.

Every forceps operation is made easier by giving pituglandol and low forceps operations are often entirely avoided. Likewise numerous complications may be successfully treated with this drug. In cases of atony, occurring postpartum and in cesarean section after delivery of the baby, pituglandol is given intravenously and secale into the uterine muscle. Sachs believes there is no danger to the normal child from the use of these drugs. J. P. GREENHILL.

Buist, R. C.: A Note on the Early Recognition and Corrective Treatment of Occipito-Posterior Presentations. British Medical Journal, Nov. 12, 1921, p. 782.

The author emphasizes the importance of diagnosis by external palpation and argues for the correction by external manipulation. He secures correction of position by the use of a binder with pads so placed as to tend to correct the posterior position by pressure on the different parts of the fetus. F. L. ADAIR.

Hamilton: The Problem of Posterior Positions. Journal Missouri State Medical Association, 1921, xviii, 305.

Hamilton thinks that posterior positions are in fact more frequent than formerly, and considers as the cause a modification of the female pelvis due to change in posture caused by high heels, to corsets, and to a general alteration in the mode of life of the modern woman.

His method of treating this condition is as follows: During the first stage, the patient is kept as comfortable as possible by means of morphine or twilight sleep. Should the membranes rupture prematurely, he introduces a large Voorhees bag. After the cervix is fully dilated, the patient is anesthetized with ether, the hand introduced, grasping the head or shoulders or both, and changing the position to an anterior. The head must be kept well flexed. The child is then pushed into the pelvis by pressure on the breech and delivered by forceps. R. E. WOBUS.

Tweedy: The Treatment of Antepartum Hemorrhage. The Clinical Journal (London), 1921, l, 5.

The author reports 72 cases of accidental hemorrhage in 18,000 deliveries with only two deaths from bleeding. He plugged thirty patients and insists that the vaginal plug, as used at the Rotunda Hospital, is efficient and does check hemorrhage by impeding the circulation of the uterine vessels. His contention has been strengthened by seeing the absence of pulsation in the uterine arteries, at cesarean section, when pressure was made from below on the lateral fornix. The operation does have some dangers, and will cause pain and may even bring about shock. Rupture of the membranes is not considered a contraindication. By such procedure the main blood supply is cut off and coagulation at the sinuses is promoted. He believes that hysterectomy has no place in accidental hemorrhage.

A. G. WILLIAMSON.

Strecker, J.: Disturbances in the Third Stage of Labor. Monatsschrift für Geburtshilfe und Gynäkologie, 1923, lxii, 283.

During the last few years of the war, it was observed that the number of postpartum hemorrhages increased markedly, and also that many women succumbed to relatively small losses of blood. Unlike eclampsia which has returned to its pre-war figure, the number of postpartum hemorrhages has remained as high as it was during the war. As "disturbances" the author considers first, retention of the placenta for 2 to 5 hours without bleeding; secondly, slow hemorrhage with retention of the placenta which requires manual removal; and thirdly, incomplete expulsion of the placenta. The last caused the greatest trouble.

In treating these patients it was found that there were fewer febrile reactions when retained portions of the placenta were removed than when the patients were treated expectantly. Many of the latter patients continued to bleed. He frequently used the method of injecting a solution into the umbilical vein to hasten separation of the placenta, but advises against its use where there is much hemorrhage. Manual removal of the placenta in cases of hemorrhage is preferable to other uncertain methods.

J. P. GREENHILL.

Seides: Pituitrin in the Third Stage of Labor. Surgery, Gynecology and Obstetrics, 1923, xxxvi, 108.

Seides administered 0.5 c.c. of pituitrin at the beginning of the third stage of labor in 500 consecutive cases. He is convinced that the results are such as to warrant its use as a routine, and maintains that it not only shortens the third stage, but makes such manipulations as Credé's maneuvers altogether superfluous. He claims to have noticed a definite diminution of the amount of blood lost postpartum, and that even the lochia were diminished to such an extent that he was able to get his patients out of bed earlier than usual. He believes that a single dose of pituitrin thus administered faciliates involution of the uterus. In no case did the pituitrin cause retention of the placenta.

R. E. WOBUS.

Abelheim: Postpartum Hemorrhage. The Medical Journal of South Africa, 1923, xviii, 167.

Patience to sit by and allow the placenta to separate normally is the greatest single factor in the prevention of postpartum hemorrhage. The uterus should not be kneaded and pressed upon before placental separation is complete. Credé's expression is only justified after the placenta has separated.

In the presence of severe hemorrhage with the placenta still *in situ* the author

stimulates the uterus to contract and then attempts expression by Credé's method. Failing, the following steps are carried out in this order: catheterization, injection of ergot, massage of the uterus, compression of the aorta, hot antiseptic douche and the injection of the placenta (through the vein in the cord) with hot sterile water. If further attempts fail and hemorrhage continues, remove the placenta manually. If bleeding continues after this expression or removal of the placenta, and there is doubt as to its having come away completely, explore the cavity of the uterus.

For hemorrhage occurring after the placenta has been delivered the simplest method of treatment is compression of the aorta with the fist or a flexible tube about the waist. If anemia is severe bind the lower limbs before applying the tube or belt. Salt solution should be given per rectum. For bleeding from an atonic uterus the author carries the fundus forward, compressing it against the symphysis. A big pad held in place by a tight binder may then be used to keep the fundus forward. Where deep cervical tears cause serious hemorrhage the author has found suture difficult and unsatisfactory. In these cases much time may be saved and the hemorrhage controlled by pressing one fist upward against the vulva and carrying the other downward back of the uterus. Compression of the structures lying between results, and thrombosis occurs in from 20 to 30 minutes. A definite routine in the treatment of postpartum hemorrhage improves the results, robs the condition of much of its terror, and inspires confidence in the apprehensive patient.

H. W. SHUTTER.

Zangemeister: Retention of Placental Rests at Full Term Delivery. Muenchener Medizinische Wochenschrift, 1921, lxviii, 388.

Teaching literature fails to stress the difficulty of diagnosing this condition and consequently treatment has become too conservative. There is, in many cases, no absolute proof regarding the completeness or incompleteness of the placenta immediately following delivery.

From his series of 4837 deliveries (divided between "conservative and radical" treatment) the author concludes that the latter method, i.e., immediate emptying of the uterus with definitely incomplete placenta, and immediate exploration (and where necessary emptying) of the uterus with completeness of placenta in doubt, does not possess any added danger unless the uterus is already infected. On the other hand, placental rests were overlooked at delivery eight times in the 3665 deliveries of the "conservative" series, and none has been overlooked in the 1772 deliveries of the "radical" series. The technic of the operation includes use of vaginal speculum, tenaculum in cervix and careful application of abortion forceps to pick out the placental rests.

S. B. SOLHAUG.

Muret: Concerning Postpartum Obstetrical Shock. Schweizerische Medizinische Wochenschrift (Basle), 1923, liii, 14.

Many observers have noted and commented on the symptoms of collapse with little or no bleeding following delivery. Mariceau and Leroux, as early as 1776, called attention to it as a syncope following delivery and not dependent on blood loss. In 1907 Wallich of Paris gave the syndrome the name of "obstetrical shock." A case of a ii para is reported. Pregnancy had been uneventful except that the patient was decidedly of nervous temperament. After an ordinary labor a baby weighing 3600 grams was born. The delivery was spontaneous and no anesthetic or narcotic was employed. The placenta was expelled easily about fifteen minutes after delivery of the child and because the membranes were torn and there was a little bleeding a low vaginal douche was given and the fragments came away. In-

spection of the perineum and cervix showed no tears and the uterus seemed to be acting well. Little by little the pulse began to rise and the patient complained of feeling faint, palsy of the left jaw, peculiar sensations in the hand and of seeing double. The feet were elevated, heat applied, warm wine administered, and camphor and oil with strychnia given subcutaneously. At intervals for the next four hours these symptoms plus ringing in the ears persisted despite the fact that the uterus remained well contracted. The pulse was small, hard to count and at times imperceptible. A consultant felt that she would die, but about twelve hours afterward the patient was quite herself except that she complained of being very tired as though her limbs were bruised from beating.

The causes are obscure. The condition might be compared with the shock following an accident in which no visible injury can be demonstrated, hence purely a nervous phenomenon as, for example in the case of a woman who after delivery went into shock when she heard the physician say that he must repair the perineum. The toxemic theory could be dismissed, because nothing in the way of a toxemia could be demonstrated, and her labor was not sufficient to consider it one of fatigue. The part that the endocrine system might play is still a question. The fact remains that there is a definite entity which might be called obstetrical shock occurring with no particular reason or warning and with no demonstrable hemorrhage. The treatment must be adapted to the individual case, and consists chiefly in stimulation. In some cases all remedies fail and death is sudden. A. C. WILLIAMSON.

Van der Perk: Acute Dilatation of the Stomach after Labor. Nederlandsch Tijdschrift voor Geneeskunde, 1923, i, 454.

While acute dilatation of the stomach after operations is quite well known, it is not so universally known that this condition occurs occasionally after labor. Van der Perk reports the case of a primigravida who had gone through a 30 hour labor, 6 hours of which was consumed by the second stage on account of a rigid perineum. An hour before delivery she was given 1 c.c. pituglandol and delivery was aided by manual pressure on the abdomen. The placenta was expelled by Credé's method 30 minutes postpartum, after which the uterus contracted well.

Six hours after delivery the patient felt miserable and began vomiting. Her face was pale and drawn, the pulse was 100 but very weak, breathing superficial and rapid. The abdomen was ballooned, most prominent around the umbilicus. The stomach could be outlined. The uterus was well contracted.

The patient was placed on the right side; some time later eructations gave partial relief. Later on she expelled flatus and eight hours later she was quite comfortable.

It is notable that the sole treatment consisted in placing the patient on her right side (some authors have recommended left side position). Gastric lavage was not resorted to. R. E. WOBUS.

Weinzierl, E.: Torsion of the Uterus During Labor. Monatsschrift für Geburtshilfe und Gynäkologie, 1922, lix, 29.

The author reports two cases of torsion of the uterus during labor. In the first, there was a dextro rotation of 200°, whereas in the second there was more than 90°rotation to the left. In both patients the condition was not suspected and was found accidentally at cesarean sections which were performed in the interest of the babies. In both cases a moderate amount of fluid was found in the abdominal cavity but no evidence of an old inflammatory condition. Marked hyperemia was present in both, but this cleared up readily after reposition of the uterus. In one case the point of rotation was low down in the cervix so that the bladder partici-

pated in the rotation. In the second, the point of rotation was at the upper limit of the cervix, just over the baby's neck. Both operations were so bloody that it was impossible to tell whether or not there had been a previous premature separation of the placenta, with intrauterine bleeding. It is interesting to note that there had been no subjective or objective symptoms to indicate any pathology. In both patients the torsion undoubtedly developed during labor, but the exact etiology is obscure. J. P. GREENHILL.

Fleurent, H.: Consideration of Some Cases of Rupture of the Uterus. Gynécologie et Obstétrique, 1921, iv, 544.

The author reports five cases of uterine rupture which have come under his personal observation. Case I.—Traumatic rupture of the uterus from a crushing injury of the lower abdomen. Case II.—Spontaneous rupture during labor. Case III.—Consultation. Rupture following version; patient had a contracted pelvis. Case IV.—Consultation. Slightly contracted pelvis; rupture following attempt at forceps on a floating head followed by extraction; intestines prolapsed through uterine rupture. Case V.—Several applications of forceps. Attempt at manual removal of placenta; intestines also prolapsed through uterine injury. The author believes in immediate laparatomy for uterine rupture whether it is complete or not.

F. L. ADAIR.

Dorland: Report of a Case of Ruptured Uterus Resulting from the Use of Pituitary Extract. Journal American Medical Association, 1922, lxviii, 191.

An octiparous woman had been in labor about twelve hours when she was given 8 minims pituitary extract (P.D. & Co.). This was repeated in an hour. Ten minutes after the second dose, the patient had a severe contraction followed by pain and signs of shock. The cervix was fully dilated. On abdominal section, a rent was found in the uterus throughout the attachment of the left broad ligament reaching almost to the fundus. The child, weighing 11 pounds, was dead. The abdomen was filled with bloody fluid, the placenta lying loose in the abdominal cavity and the uterus was firmly contracted.

Supravaginal hysterectomy was done and the patient rallied well under appropriate treatment, but died 48 hours after operation from exhaustion. R. E. WOBUS.

Keller, Raymond: Difficulties in the Diagnosis of Rupture of the Uterus. Gynécologie et Obstétrique, 1921, iii, 112.

In rupture of the uterus the classical signs, tearing pain, followed by rapid feeble pulse, pallor and syncope are not always present.

Keller outlines eleven cases. In these cases, the approximate time when diagnosis was made was as follows: 3 during delivery by clinical observation; 4 during manual extraction of the placenta; 1 at operation for fetus free in abdominal cavity; 1 four days after delivery; and 2 at autopsy.

Two premonitory signs are of value; mounting of Bandl's ring to the level of or above the umbilicus, and palpable tension of one or both round ligaments.

After rupture, the diagnostic signs were variable, and it was exceptional to obtain signs that left no doubt regarding the diagnosis. Signs sufficient to make a diagnosis are: the presence of a soft mass above the pubis that was not there before and which enlarges under the eye, and small parts of the fetus directly under the abdominal wall. Diagnosis of rupture can be made with certainty only when one can feel the rent in the uterus or the fetal parts directly under the abdominal wall.

R. T. LAVAKE.

Manton: Report of Two Cases of Acute Inversion of the Uterus. New York Medical Journal, 1921, cxiv, 397.

The author reports two cases of acute inversion of the uterus, one occurring in the third stage of labor in a multipara, probably the result of slight traction on the cord, the other occurring spontaneously on the tenth day in a primipara. Both of these cases showed no shock and made uneventful recoveries following easy manual reposition of the uterus under ether anesthesia. In the second case the uterus had been inverted for two days before the patient came under the author's observation.

Etiologic factors in this condition are traction on the cord, precipitate labor, delivery in the upright position and a short cord. Strong pressure from above in attempts at rapid delivery of the placenta may produce a similar effect, or even sudden strong contractions of the abdominal muscles acting upon a relaxed uterus. The author believes that the complication occurs more frequently in private practice than in the large maternity hospitals, and is largely the result of unskilled midwifery. The mortality is high, ranging up to 40 per cent. Death occurs from shock, hemorrhage (acute anemia) and sepsis.

The diagnosis of complete inversion presents no difficulties, but the partial type requires careful examination with this possibility in mind to determine the cause of a shock or hemorrhage.

The treatment should be prophylactic. Unjustifiable violence in the third stage should be avoided. When the condition actually occurs, shock and hemorrhage should be combated before an attempt at reinversion is made. When the placenta is still adherent, as it is in a considerable number of cases, it should be peeled off the uterus as quickly and thoroughly as possible without injury. Reduction may be accomplished by the aid of a small Voorhees bag, by packing, or by pressure with the coned finger tips. Following reinversion, the hand should be left inside the cavity until uterine contractions can be established, when it may be slowly withdrawn. The uterus should then be washed out with a hot, weak, antiseptic solution, and if there is a tendency to relax, both uterus and vagina should be packed with sterile gauze.

MARGARET SCHULZE.

Faust: Inversion of the Uterus. Journal of the Kansas Medical Society, 1921, xxi, 317.

Most cases occur in private practice, sometimes due to errors and sometimes occurring spontaneously up to the fifteenth day after delivery. The inversion may be partial or complete. It is most common in primiparae and is due to paralysis of the placental site, too vigorous compression of the fundus, or traction on the cord. It may also occur by contraction of the fundus with relaxation of the lower uterine segment, and from atony of the uterus. Any of these conditions may be augmented by intraabdominal pressure. Symptoms are pain, hemorrhage, and shock. Mortality is as high as 50 per cent. Prognosis depends on prompt treatment which consists in replacing the uterus in its natural position. Two cases are reported.

W. K. FOSTER.

Philips: Prolapse of the Spontaneously Inverted Puerperal Uterus. Nederlandsch Tijdschrift voor Geneeskunde, 1922, i, 2058.

Philips reports the following case: A married woman aged 31 years entered the hospital during the latter part of her third pregnancy. Five years ago she had her first child. The labor was normal except that the placenta had to be removed manually, the method of Credé having proved ineffective. Fifteen months after-

ward she was again delivered. The placenta was expressed by Credé's method, carrying with it the inverted uterus to which it was still adherent. It was removed and thirteen days later she was taken to the hospital, where the uterus was replaced. Her recovery was rapid.

This time she again passed through a normal labor, but the placenta did not appear. All manipulation was avoided. There had been no traction on the cord, which was of ample length. The blood loss was scant. Twenty minutes after delivery, Philips noticed a funnel shaped depression in the fundus. Ten minutes later, the bleeding became so profuse as to cause acute anemia. It was then decided to remove the placenta, which lay in the vagina. However, it was found that the uterus had already become inverted and that the placenta was still firmly adherent. The inversion, which became complete during this maneuver, caused considerable shock. Under ether the uterus was replaced. Except for a foul vaginal discharge, the convalescence was normal.

Philips takes up the question whether, under such conditions, it were not advisable to perform sterilization.

R. E. WOBUS.